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DEPARTMENT OF REGISTRATION AND EDUCATION

MINERAL RESOURCES AND MINERAL INDUSTRIES OF THE EAST-CENTRAL ILLINOIS REGION

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Robert L. Major

A B S T R A C T

The mineral resources, primary mineral producing operations, and mineral processing facilities in the East-Central Illinois Region are located and described in this report. The region includes the 25 counties which compose the east-central portion of the state of Illinois—Bureau, Champaign, Coles, DeWitt, Douglas, Edgar, Ford, Grundy, Iroquois, Kankakee, Kendall, LaSalle, Livingston, Logan, McLean, Macon, Marshall, Moultrie, Peoria, Piatt, Putnam, Stark, Tazewell, Vermilion, and Woodford.

Value of mineral production in 1964 was $79.1 million, and the minerals and mineral products produced, in order of their value, were cement, clay products, coal, silica sand, crushed and broken stone, gravel, crude oil, and sand. In addition, the region possesses undeveloped minerals of potential importance such as gypsum and anhydrite, oil shales, feldspar-bearing sands, and pyrite. Most of the metal processing facilities are concentrated in the towns along the Illinois River and include plants for both ferrous and nonferrous metals. Two perlite processing plants, two cement manufacturing plants, and two cement distributing plants also are located in the region.

INTRODUCTION

This report is the fourth in a series of eight concerning Illinois mineral resources and related mineral industries. The series is prepared by the Mineral Economics Group, with the assistance of staff members in other sections of the Illinois State Geological Survey. Each report considers one particular region of the state, and this one covers the East-Central Illinois Region, which comprises 25 counties—Bureau, Champaign, Coles, DeWitt, Douglas, Edgar, Ford, Grundy, Iroquois, Kankakee, Kendall, LaSalle, Livingston, Logan, McLean, Macon, Marshall, Moultrie, Peoria, Piatt, Putnam, Stark, Tazewell, Vermilion, and Woodford (fig. 1).

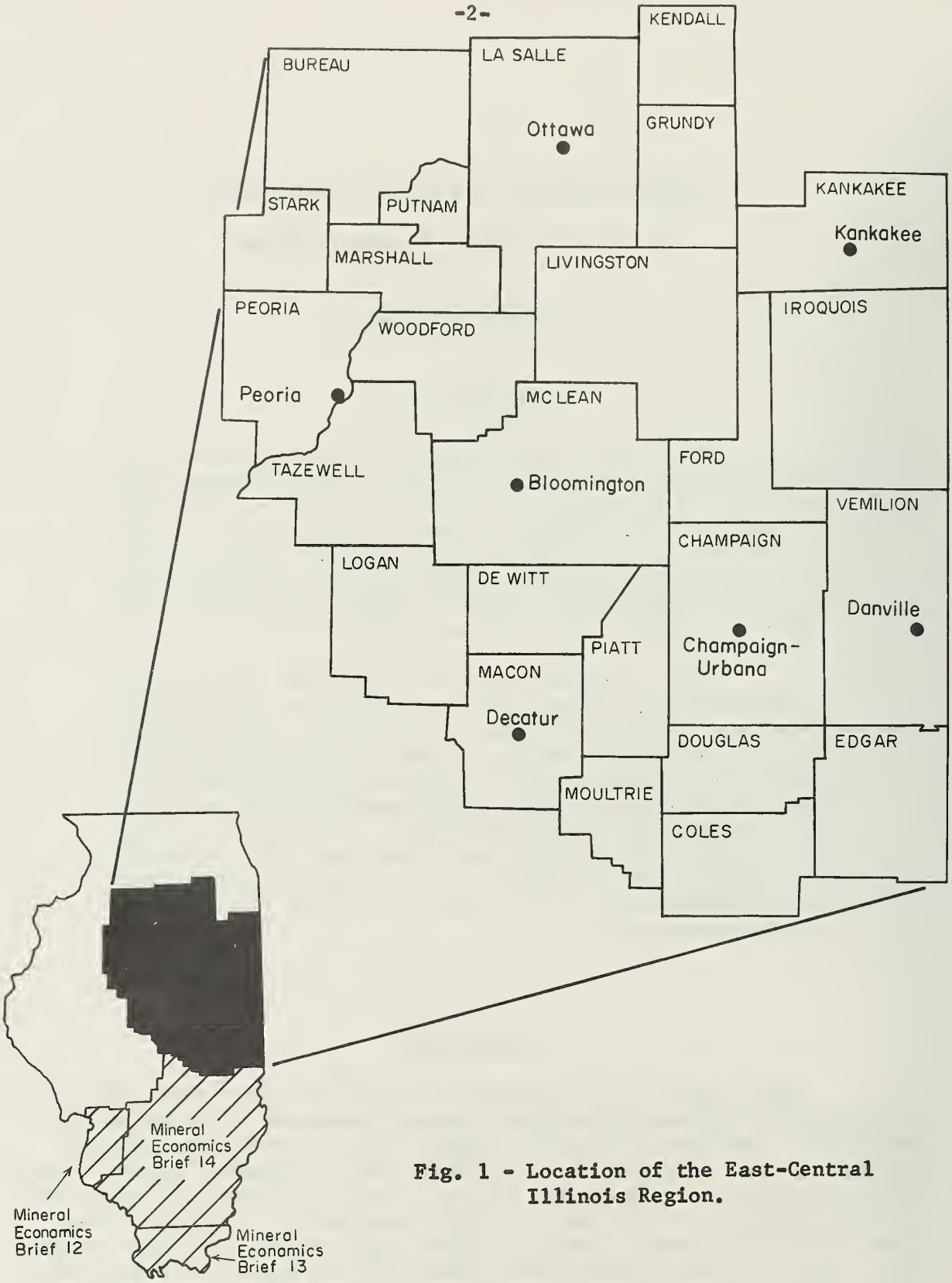

Fig. 1 - Location of the East-Central Illinois Region.

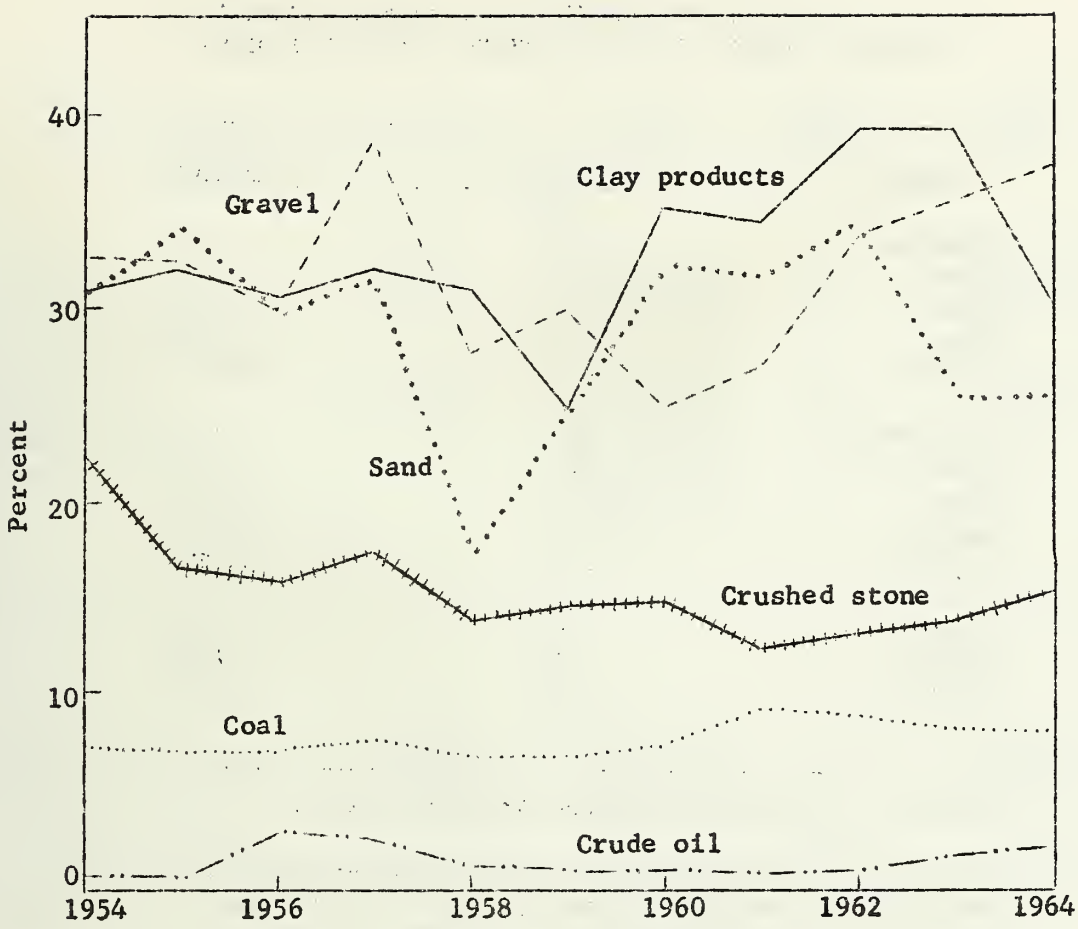

Fig. 2—Mineral production of the East-Central Illinois Region shown as a percentage of the total Illinois production for each commodity.

The relative importance of this region as a producer of various mineral commodities from 1954 to 1964 is shown in figure 2. During this period the East-Central Illinois Region averaged 33 percent of the state's production of clay products, 32 percent of the gravel, 29 percent of the sand, 16 percent of the crushed and broken stone, 8 percent of the coal, and 1.5 percent of the crude oil. In addition, this region is the single most important area in the state for the production of silica sand and cement. The size of the payroll and the number of employees dependent upon the mineral industries in selected counties in the East-Central Illinois Region are shown in table 1.

The value of mineral production for the region (table 2) was $84.8 million in 1963 and $79.1 million in 1964, or 13.8 percent and 12.7 percent, respectively, of the state total for each of the two years. The main commodities produced, in order of their 1964 value, were cement, clay products, coal, silica sand, crushed and broken stone, gravel, crude oil, and sand.

TABLE 1 - EMPLOYMENT AND PAYROLL OF THE MINERAL INDUSTRIES IN SELECTED COUNTIES OF THE EAST-CENTRAL ILLINOIS REGION*

County	Employees	Payroll (in $1000)
Champaign	16	69
Coles	190	823
Douglas	153	1,041
Edgar	9	39
LaSalle	891	4,667
Livingston	137	617
Logan	87	400
Macon	219	1,483
Moultrie	3	10
Peoria	199	1,029
Piatt	2	9
Tazewell	59	286
Vermilion	241	1,460

*Source: U. S. Census of Mineral Industries, 1958.

Data were not available for 12 counties; however, only Stark County did not report any mineral production during 1964. Among the other 11 counties, three produced coal, one crude oil, three clay products, two crushed stone, eight common sand, and eight common gravel.

Each of the commodities is discussed in terms of resources, past and present production, and the extent of producing facilities. Undeveloped minerals of potential importance also are considered, as well as the mineral and metal processing facilities of the East-Central Illinois Region.

COAL

Illinois is abundantly endowed with coal resources. A detailed assessment and classification of coal reserves in the state was begun in 1950 under the direction of Gilbert H. Cady, then Head of the Coal Section of the Illinois State Geological Survey. The results were published by the Geological Survey in 1952 as Bulletin 78 (Cady, 1952). Estimates for 20 coals were made and grouped into four categories of reserves—proved, probable, strongly indicated, and weakly indicated—based on the reliability of data. All coals that were less than 28 inches thick were excluded.

TABLE 2—MINERAL PRODUCTION IN THE EAST-CENTRAL ILLINOIS REGION

Commodity	Quantity	Value	Operations	Average value
		1963		
Coal (tons)	3,828,167	$14,547,035	19	$3.80/ton
Crude oil (barrels)	1,274,000	3,771,040	---	2.96/bbl
Limestone (tons) (crushed & broken)	4,901,317	6,826,350	19	1.39/ton
Sand (tons)	3,207,213	2,939,523	42	0.92/ton
Gravel (tons)	5,174,364	5,658,305	75	1.09/ton
Clay products	---	21,076,801	16	---
Other materials*	---	29,960,589	---	---
Total value		$84,779,643		
		1964		
Coal (tons)	3,901,985	$14,788,509	17	$3.79/ton
Crude oil (barrels)	1,493,000	4,734,490	---	2.93/bbl
Limestone (tons) (crushed & broken)	5,916,250	8,170,685	22	1.38/ton
Sand (tons)	3,476,000	3,066,000	40	0.88/ton
Gravel (tons)	6,162,000	6,817,000	78	1.11/ton
Clay products	---	15,135,568	14	---
Other materials†	---	26,355,756	---	---
Total value		$79,068,008		

* Includes silica sand (average value $3.62/ton) and cement (average value $3.27/bbl).

† Includes silica sand (average value $3.29/ton) and cement (average value $3.22/bbl).

The total estimated reserves of all classes amounted to more than 137 billion tons in the ground, of which 61 billion tons were included in the two most reliable classes. The commercial coals of Illinois were formed during the Pennsylvanian Period.

No attempt was made in Bulletin 78 to differentiate strippable reserves from underground reserves despite the recognized need for such differentiation. Therefore, in 1957, a new study was begun to evaluate strippable coal reserves in the state. The state was divided into nine resource regions, and by the end of 1965 reports on five of these had been completed. The results have been published as Illinois State Geological Survey Circulars 228, 260, 311, 348, and 374 (Smith, 1957, 1958,

TABLE 3—AVERAGE COAL VALUES*

County	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Bureau	4.04	4.24	c	c	c	c	c	c	c	c
Douglas	4.22	4.33	c	4.56	4.48	c	c	c	c	c
Grundy	4.76	4.86	c	c	--	--	c	c	c	c
Kankakee	4.76	4.86	c	c	c	c	c	c	--	c
LaSalle	2.15	c	c	c	4.53	--	--	--	--	--
Livingston	6.13	8.76	8.50	--	9.00	--	--	--	--	--
Logan	6.97	6.61	5.00	c	6.64	5.81	4.50	5.00	4.96	4.98
Peoria	4.17	4.30	4.92	4.87	5.10	5.11	5.03	4.96	4.90	4.86
Stark	--	--	--	--	--	4.32	c	c	c	c
Tazewell	4.82	5.07	--	--	--	--	--	--	--	--
Vermilion	3.98	4.24	4.41	4.43	4.50	4.46	c	c	4.32	c
State average	3.66	3.84	4.00	4.02	4.06	4.00	3.91	3.86	3.80	3.79

* Source: U. S. Bureau of Mines. Average value per ton = value received or charged for coal f.o.b. mines as reported to the U. S. Bureau of Mines. Includes a value for coal not sold but used by producers, such as mines fuel and coal coked, as estimated at average prices that might have been received if such coal had been sold commercially.

c Confidential data.

1961; Smith and Berggren, 1963; Reinertsen, 1964). In these reports the coals were estimated for various depths of overburden (0 to 50 feet, 50 to 100 feet, and 100 to 150 feet) and according to reliability of data (Class I - Primary Reserves; Class II - Secondary Reserves). Coals less than 18 inches thick were excluded.

Total coal reserves in the East-Central Illinois Region, as reported in Bulletin 78, amounted to 24.6 billion tons or about 18 percent of the state's total coal reserves. Strippable reserves for that part of the region in which strippable coal studies have been completed have been estimated at 3.4 billion tons in the ground. Figures 3 and 4 show the county-by-county breakdown on strippable and total minable coal reserves.

Locations of operating coal mines in the East-Central Illinois Region in 1964 are shown in figure 5. Production has occurred in 18 counties, but only seven counties were active in 1964. Vermilion and Peoria Counties were the leading producers in 1964 and in cumulative production. For each county the cumulative production of coal from 1882 to 1964, the total number of active mining years, and the last year of reported production appear in figure 6.

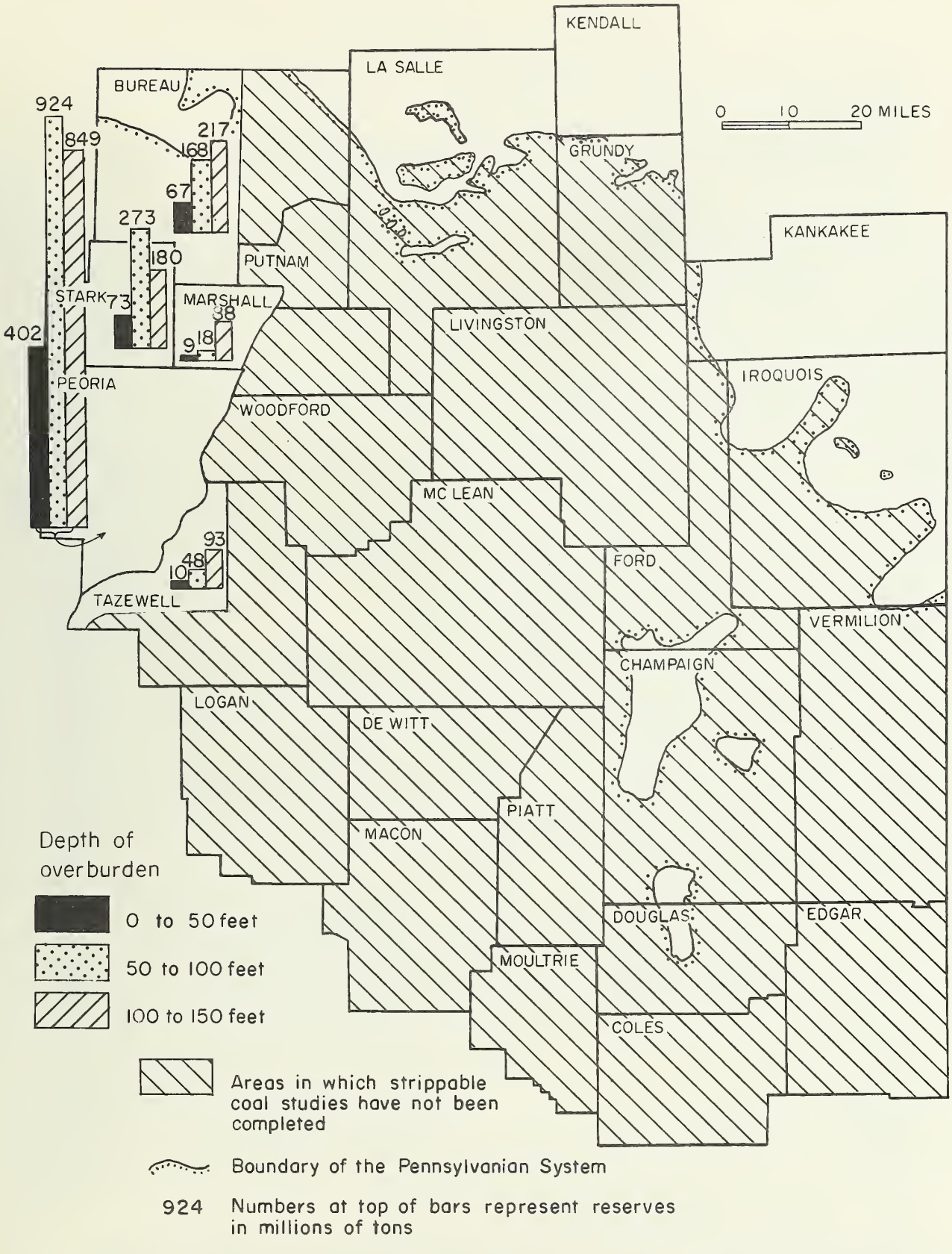

Fig. 3 - Strippable coal resources in the East-Central Illinois Region.

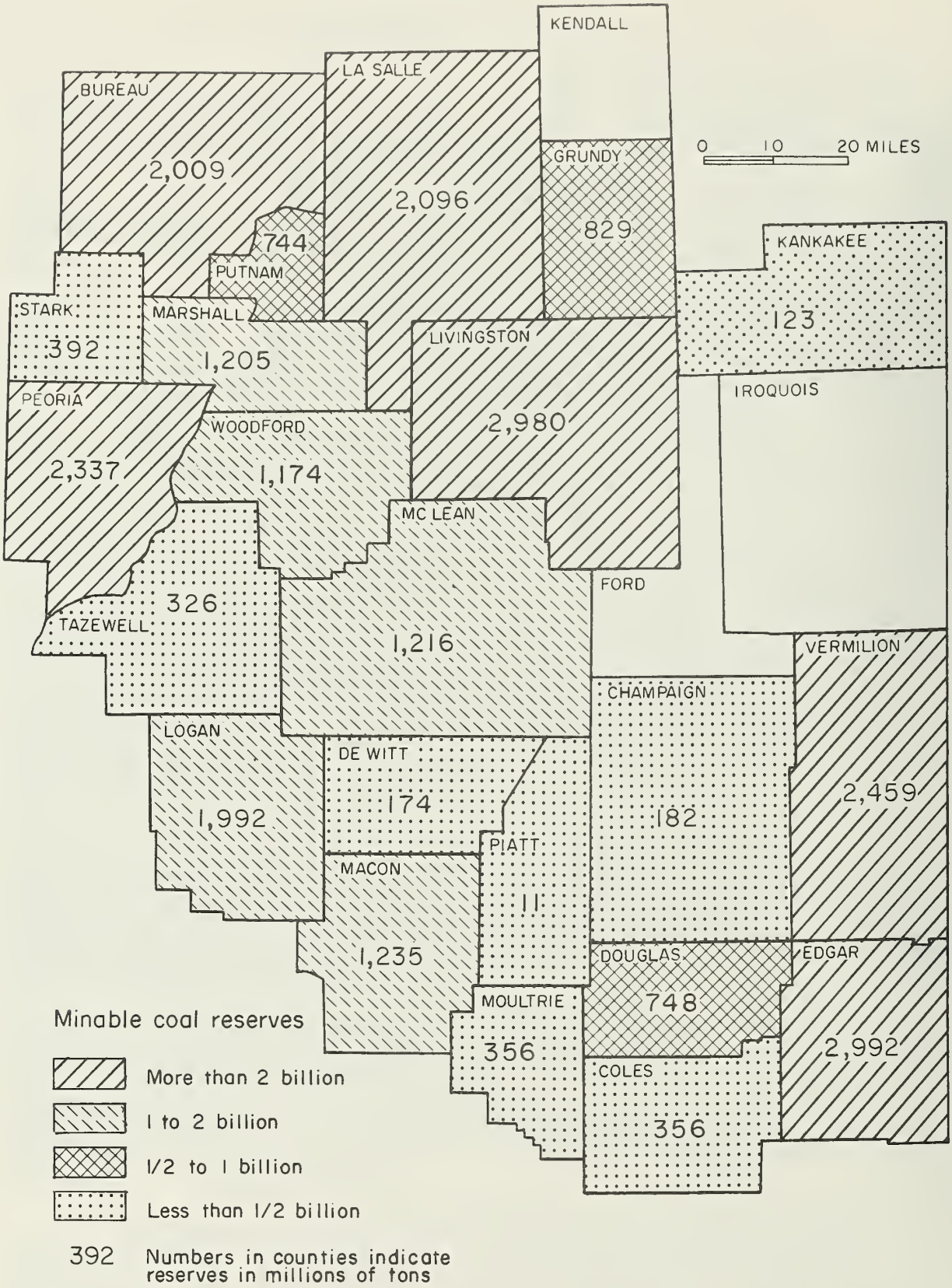

Fig. 4 - Minable coal reserves, in millions of tons, of the East-Central Illinois Region.

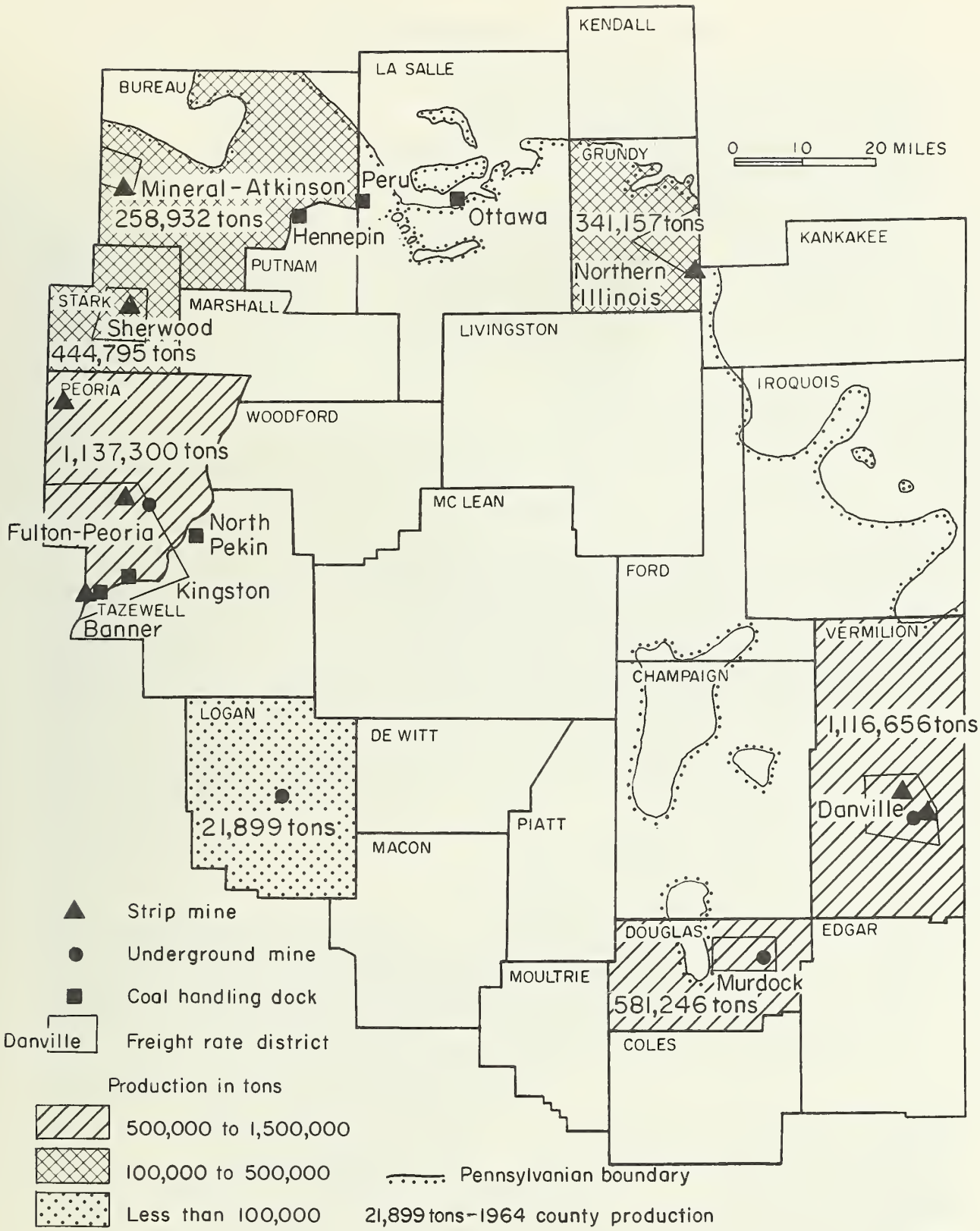

Fig. 5 - Coal mines and their production in the East-Central Illinois Region, 1964. All shipping mines and those local mines that produced 10,000 tons or more in 1964 are included.

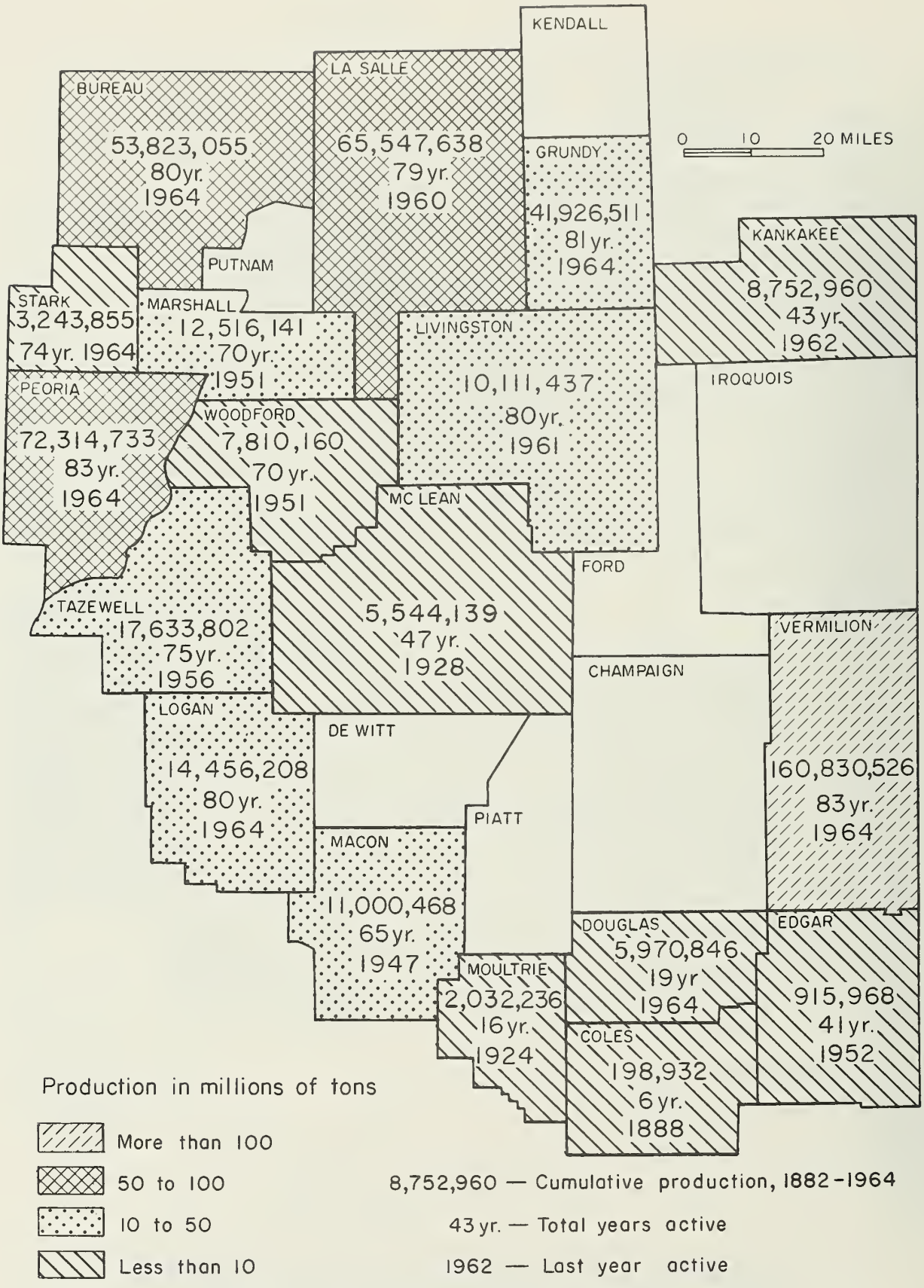

Fig. 6 - Cumulative coal production data for the East-Central Illinois Region.

TABLE 4--CRUDE OIL PRODUCTION STATISTICS FOR THE EAST-CENTRAL ILLINOIS REGION

County	Cumulative production (1888-1964)	1964 Production		
		Barrels	Value*	Percent of state total
Coles	18,308,000	999,000	$2,927,070	1.42
DeWitt	520,000	245,000	717,850	0.35
Douglas	3,015,000	148,000	433,640	0.21
Edgar	2,543,000	60,000	175,800	0.09
Macon	786,000	36,000	105,480	0.05
Moultrie	56,000	5,000	14,650	0.01
Total	25,228,000	1,493,000	$4,374,490	2.13

* Average price estimated at $2.93 per barrel.

Figures 7 and 8 indicate some general trends in the coal industry from 1948 to 1964. The number of operating mines declined sharply while over-all production more than doubled. At the same time, the average size of the mines was increasing and the productivity of the miners also improved markedly. It should be noted that since 1952 most of the increased production from the East-Central Illinois Region can be accounted for by the growth in strip mining.

Table 3 (page 6) gives the average reported value per ton of coal produced by county and year from 1955 to 1964.

OIL AND GAS

The East-Central Illinois Region lies in the northernmost part of the Illinois Basin producing area. Production of crude oil has been achieved in only six of the region's 25 counties—Coles, DeWitt, Douglas, Edgar, Macon, and Moultrie. The locations of the various oil and gas fields in the region are shown in figure 9. Although past production has come from rock units of several different ages, the bulk of it was produced from rocks of Mississippian age.

After a peak year in 1956, the production rate declined sharply in the East-Central Illinois Region. Beginning in 1962 there was an increase in production, and by 1964 production was 1,493,000 barrels or about 2 percent of the state total. Figure 10 is a graphic representation of the region's crude oil production for the period from 1954 to 1964. Table 4 shows the 1964 production and cumulative production (1888 to 1964) for the six oil-producing counties.

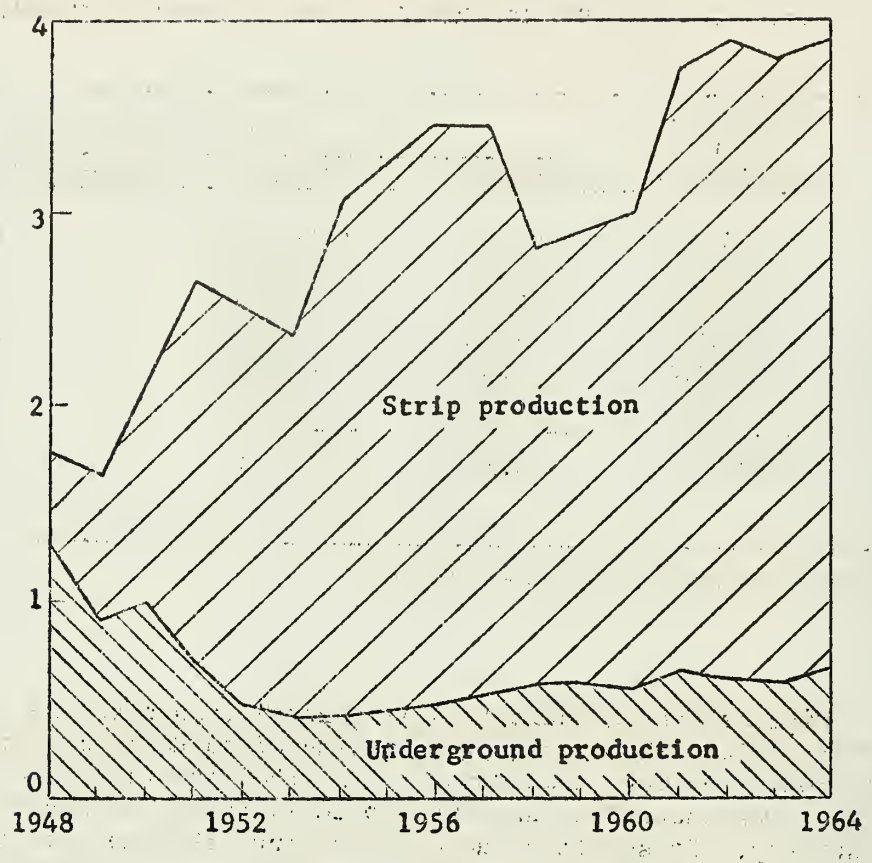

Fig. 7—Annual coal production in the East-Central Illinois Region, 1948 to 1964.

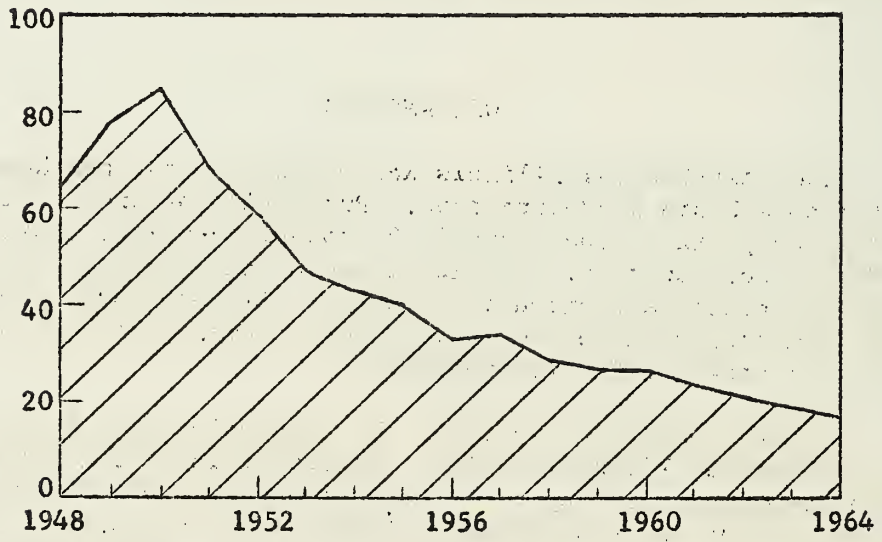

Fig. 8—Number of operating coal mines in the East-Central Illinois Region, 1948 to 1964.

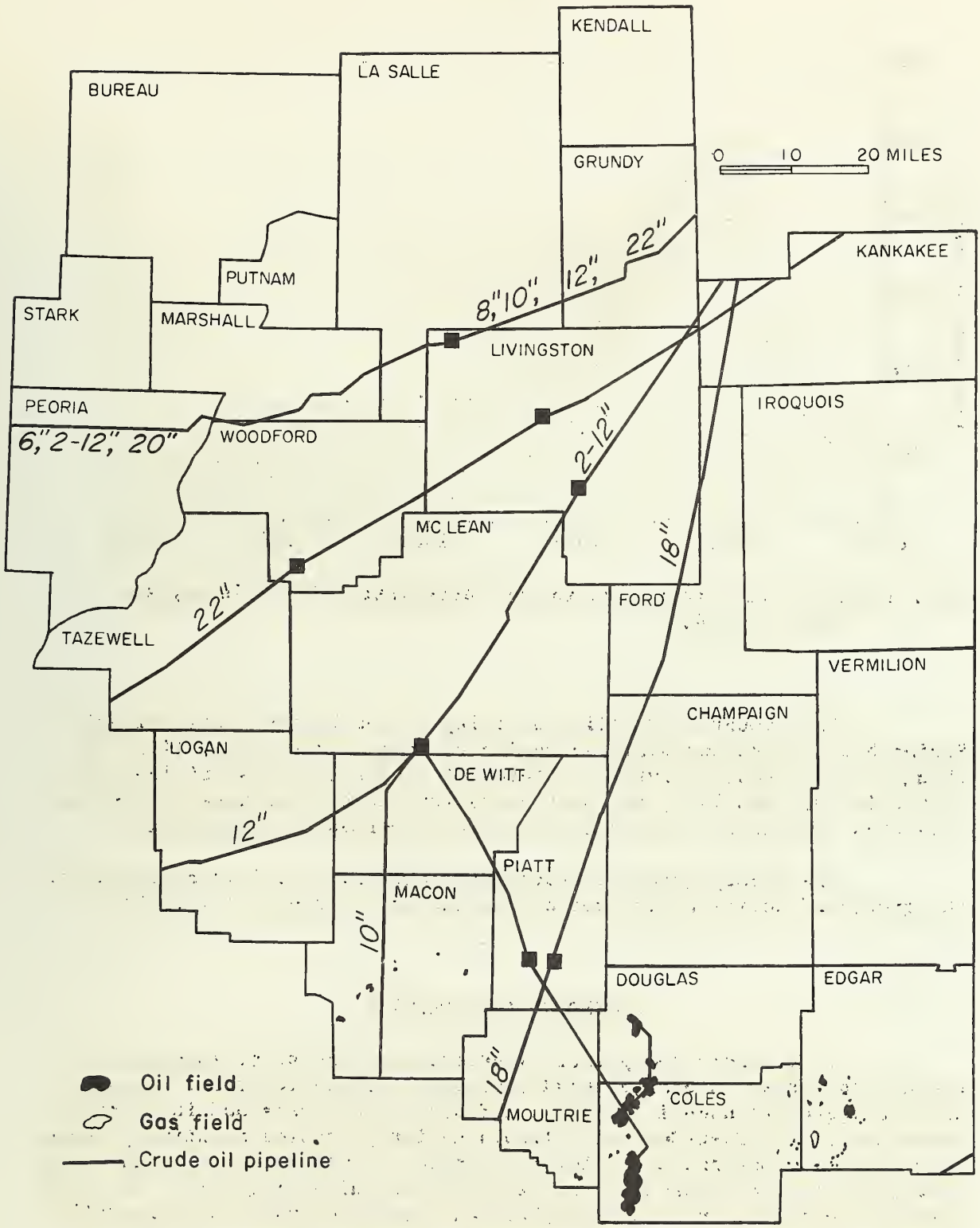

Fig. 9 - Oil and gas fields and pipelines in the East-Central Illinois Region.

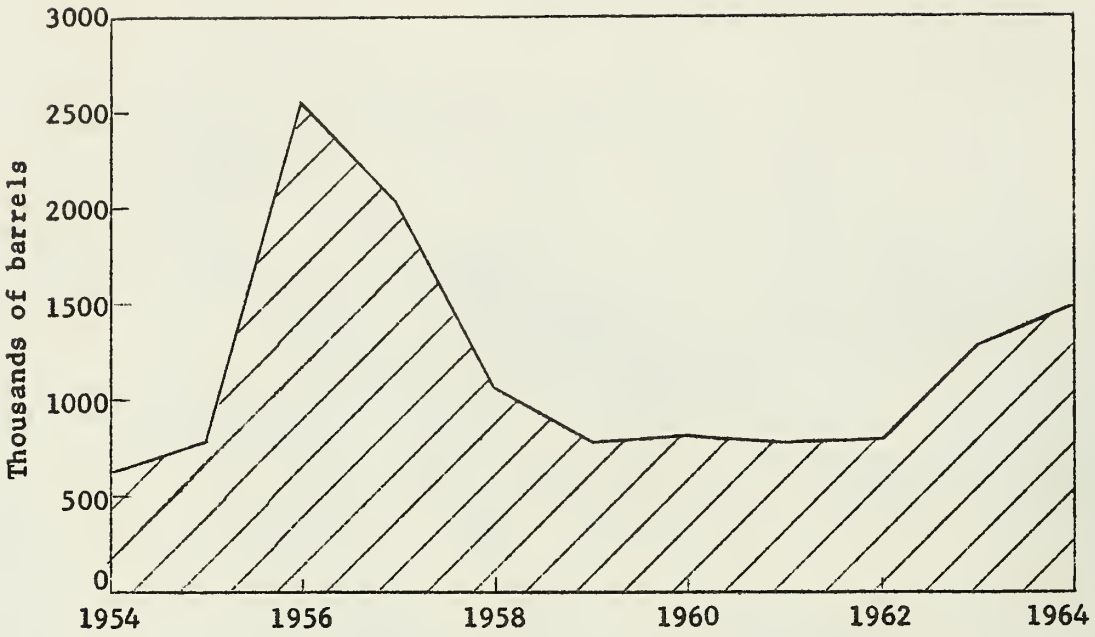

Fig. 10—Crude oil production in the East-Central Illinois Region, 1954 to 1964.

The amount of drilling activity in the East-Central Illinois Region has been rather variable during the past decade (fig. 11). Although the greatest activity, in terms of number of wells drilled, occurred in 1956 and 1957, the best years for discoveries were in 1963 and 1964 when the success ratios were 47 and 52 percent, respectively.

The steady growth in secondary recovery of oil is reflected in the growth of active waterflood operations in the region (fig. 12).

LIMESTONE AND DOLOMITE

In Illinois the principal products of the stone industry are crushed and broken stone for road surfacing, for agricultural limestone, and for aggregate used in concrete and bituminous roads and in concrete structures. The East-Central Illinois Region possesses relatively meager exposures of limestone and dolomite compared to most other regions in the state, but some of these are exploited rather fully (fig. 13). The most extensive outcrops are the Pennsylvanian limestones, which are generally rather thin. However, in the northeastern part of the area there are exposures of dolomites and dolomitic limestones of Ordovician and Silurian age that are often thick and of high purity. The nearness of these northern deposits to the metropolitan Chicago area increases their value as resources.

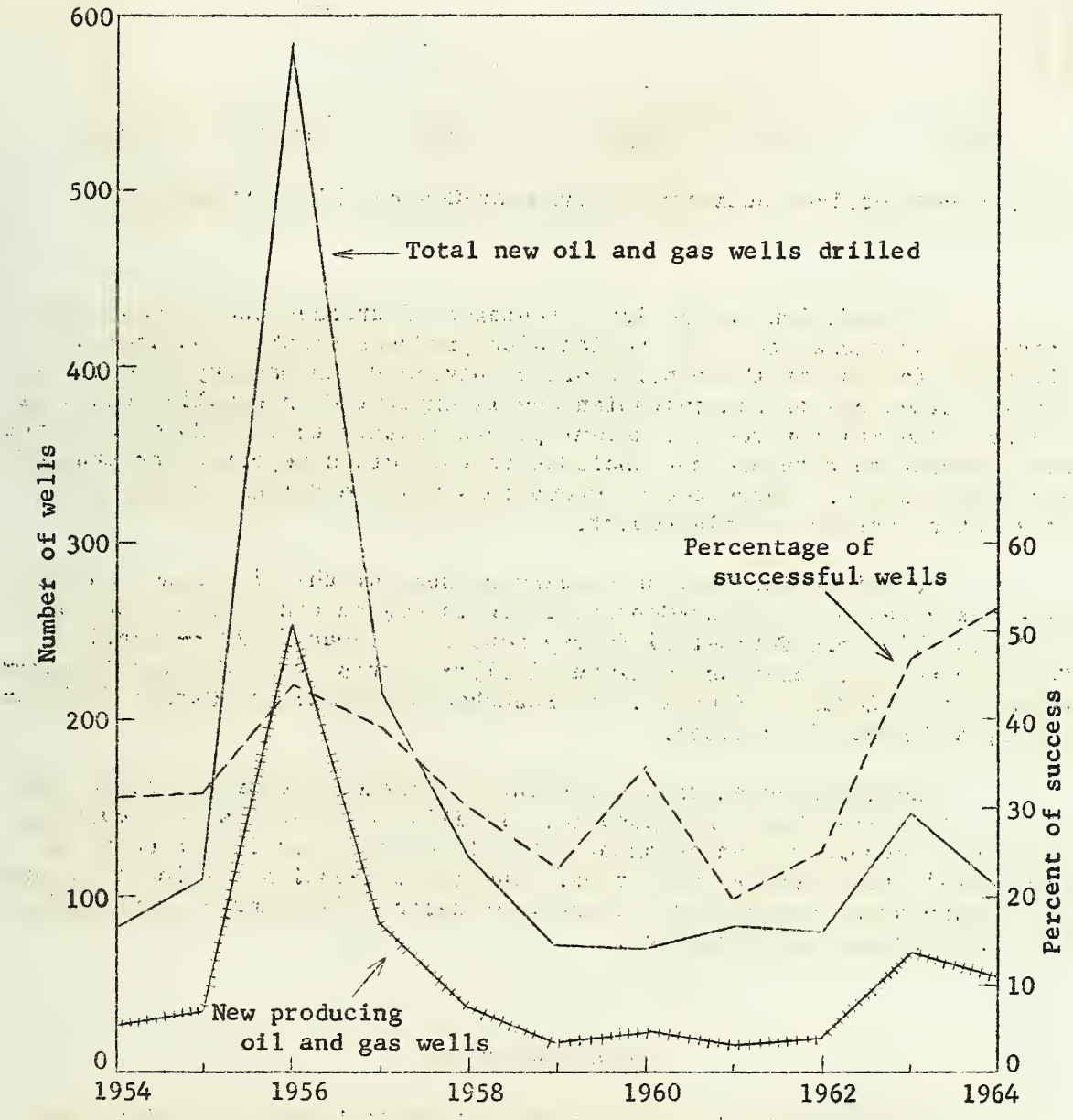

Fig. 11—Drilling activity in the East-Central Illinois Region, 1954 to 1964.

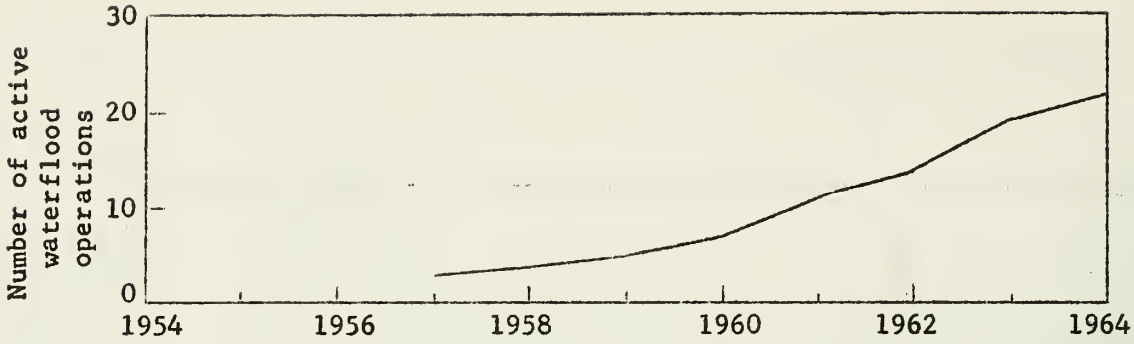

Fig. 12—Waterflood activity in the East-Central Illinois Region.

In addition to the large tonnages of crushed and broken stone produced for aggregates, the region also produces sizable tonnages of limestone for use in the manufacture of portland and masonry cement. The LaSalle Limestone of Pennsylvanian age is exploited in LaSalle County as the raw material for the two cement plants located there. However, cement rock production data are not included in the totals reported for crushed and broken stone. These cement operations will be discussed more fully in a later section of this report.

Detailed information concerning some of the limestone and dolomite resources of the East-Central Illinois Region can be found in the following Illinois Geological Survey reports: Lamar (1929)— Pontiac-Fairbury region; Lamar and Willman (1931)— Morris area; Willman (1943)— dolomites in LaSalle, Kendall, and Kankakee Counties; and Ostrom (1957)— Grundy and Kendall Counties.

Regional production and value of crushed and broken stone from 1954 to 1964 are shown in figure 14. In 1964, 22 quarries in 9 counties reported a combined production of 5.9 million tons, or 15.3 percent of the state's total stone production. The three counties leading in crushed and broken stone production, in order of their 1964 tonnage, were Kankakee, Livingston, and Vermilion.

SAND AND GRAVEL

Sand and gravel deposits are important natural resources that occur in many places in Illinois. These deposits are, with the exception of a few deposits located in extreme southern and western Illinois, related to past glacial activity. The Illinoian and Wisconsinan glaciations produced the most important economic sand and gravel deposits in the state. An explanation of the origin of these deposits was prepared by Lamar and Willman (1958). Figure 15 shows the location of known sand and gravel resources in the East-Central Illinois Region.

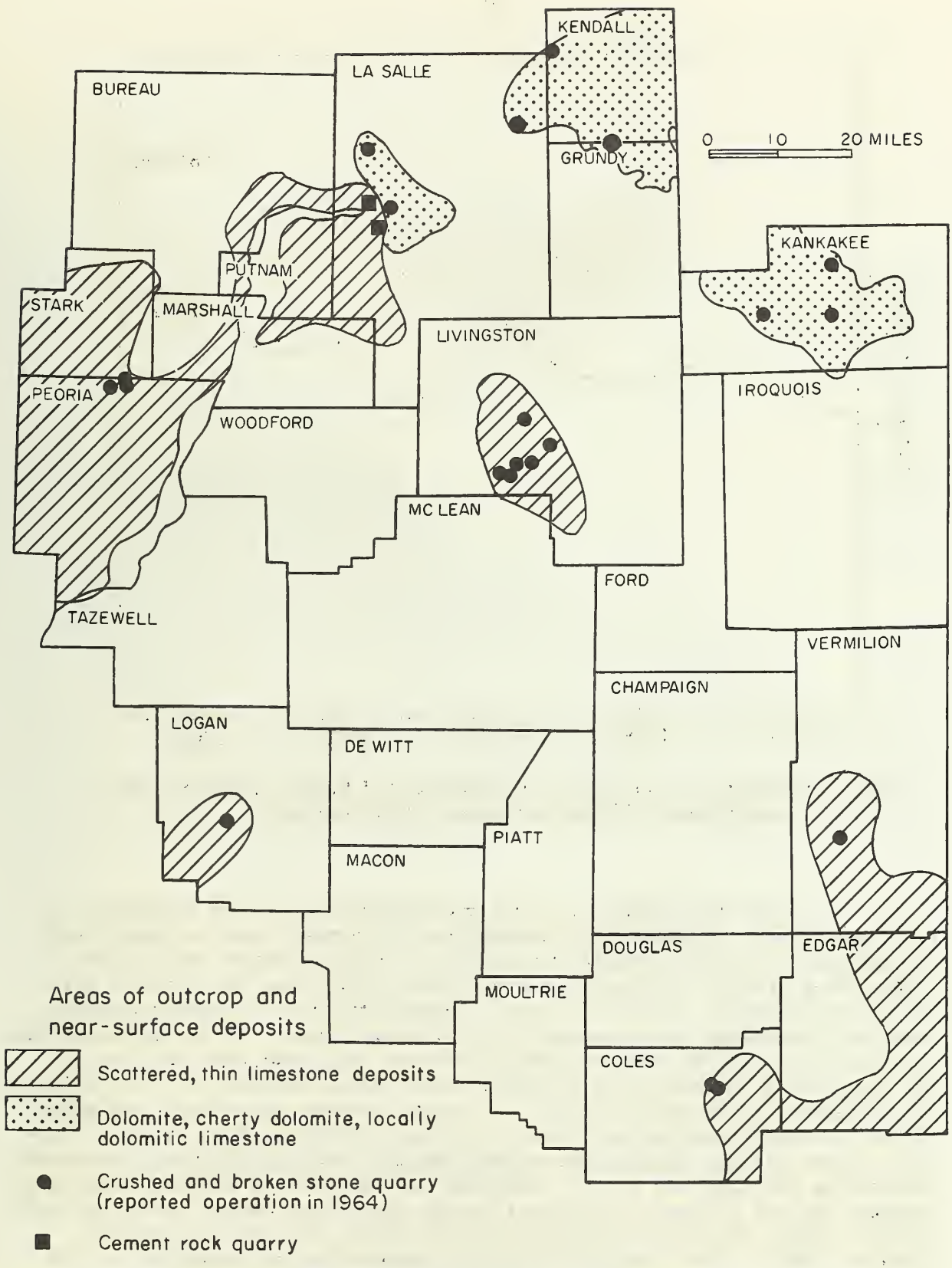

Fig. 13 - Stone resources and operations in the East-Central Illinois Region. (Adapted from "Preliminary Map of Limestone Outcrops," compiled by Lamar and Shrode, 1950).

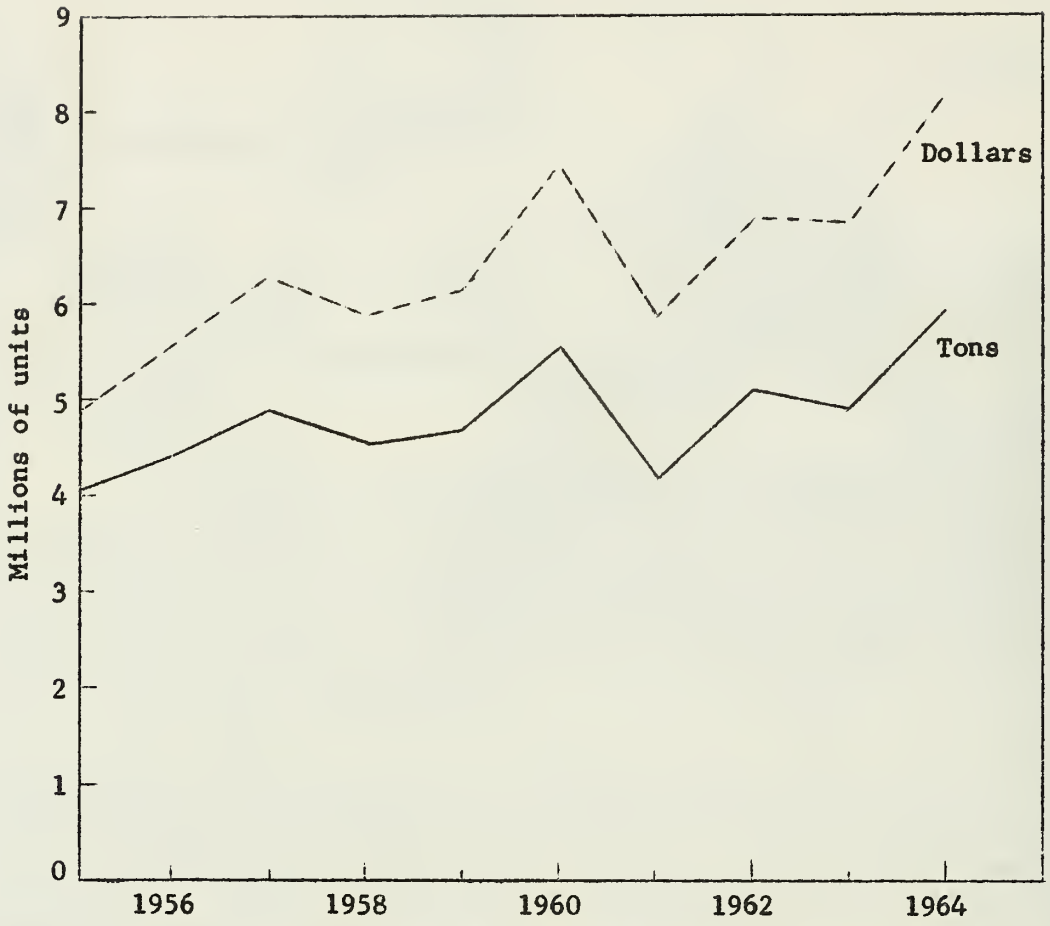

Fig. 14—Production and value of crushed and broken stone in the East-Central Illinois Region, 1955 to 1964.

It is not possible to give any meaningful data on reserves. As sand and gravel are low-value commodities, the market area in which they can compete is usually sharply restricted. Transportation costs often represent a greater portion of the delivered price than the initial value of the raw material at the pit site. Because of this, a deposit usually must be quite close to the market area to be economic. To be more specific, a study of nationwide transportation patterns has shown that rail hauls for aggregates average 80 to 90 miles; water hauls average 30 to 35 miles; truck hauls, accounting for about 80 percent of sand and gravel transportation, probably average well under 30 miles (Davidson, 1965, p. 1). However, these figures average out widely varying local conditions. Detailed reports on the sand and gravel resources in east-central Illinois have been prepared by the Illinois Geological Survey for Peoria County (Anderson and Hunter, 1965), Champaign County (Anderson, 1960), and Tazewell County (Hunter, 1966). More county reports are expected to be completed in the future.

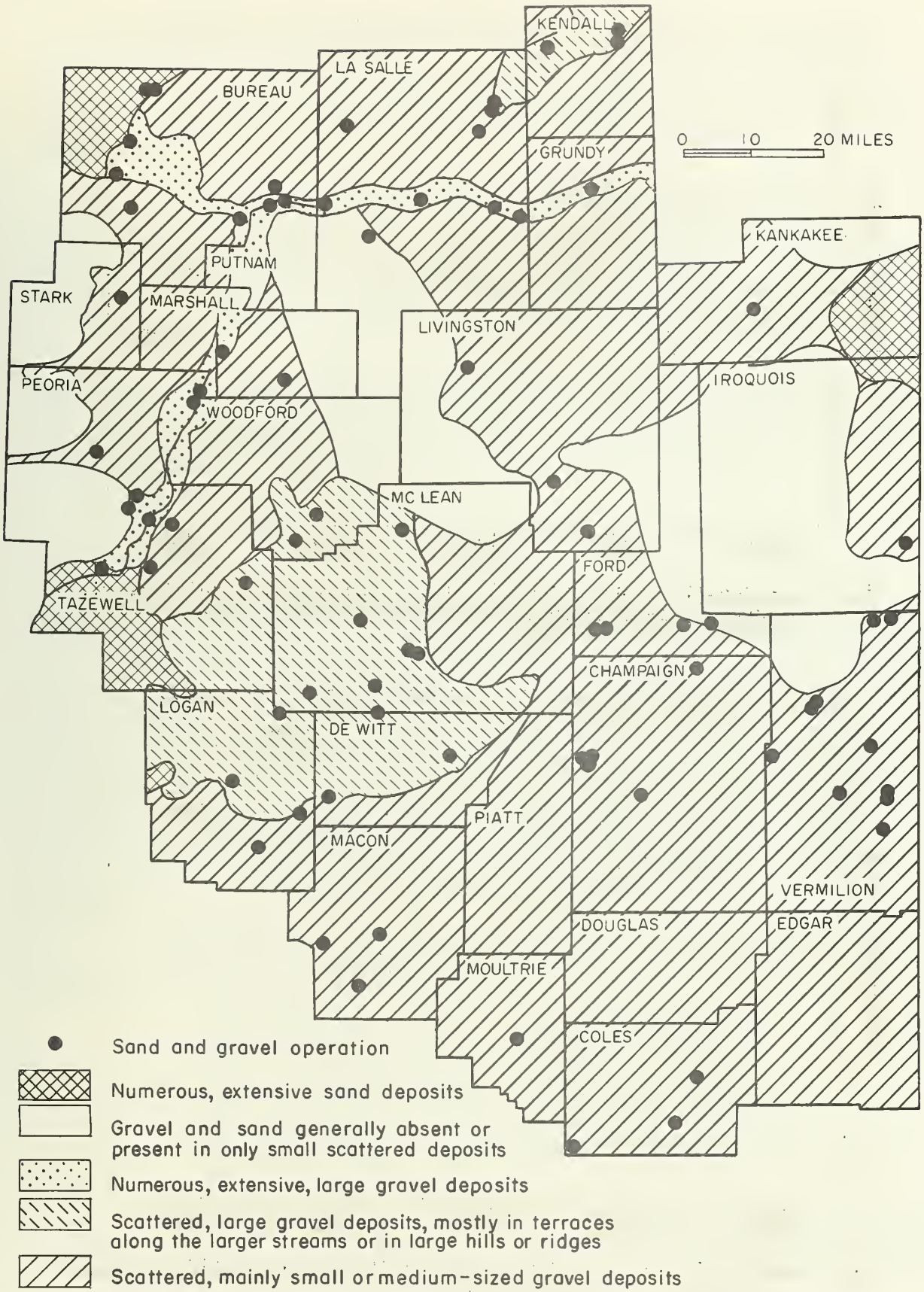

Fig. 15 - Sand and gravel resources and operations in the East-Central Illinois Region. (From a map of sand and gravel resources of Illinois by G. E. Ekblaw.)

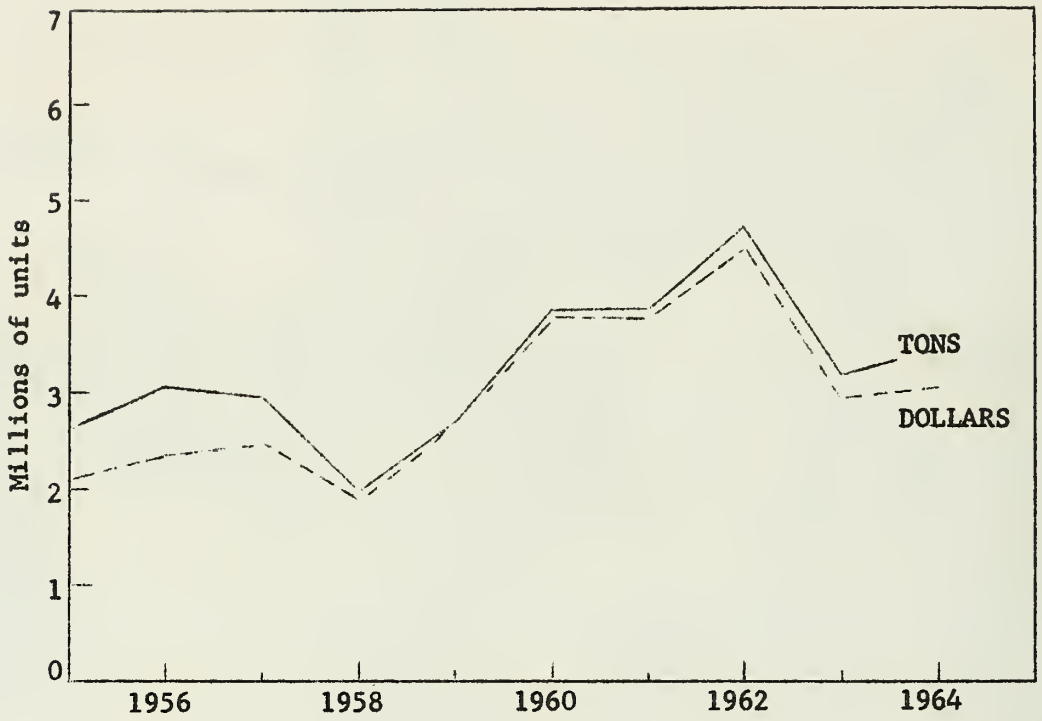

Fig. 16—Production and value of sand in the East-Central Illinois Region, 1955 to 1964.

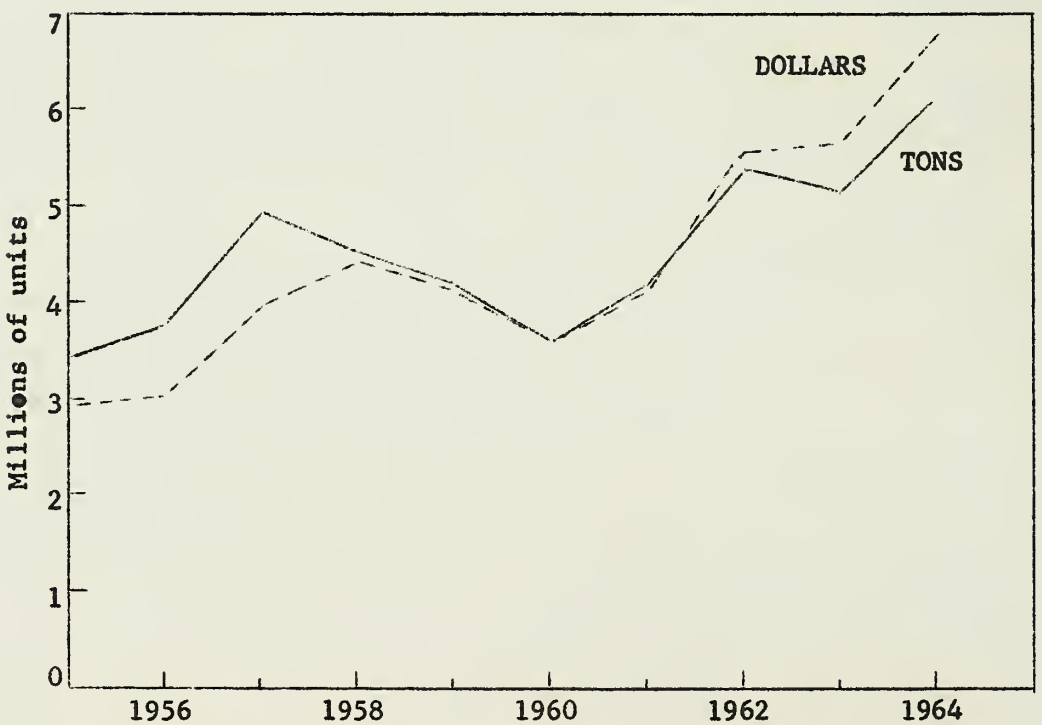

Fig. 17—Production and value of gravel in the East-Central Illinois Region, 1955 to 1964.

Production and value of sand produced in the East-Central Illinois Region between 1955 and 1964 are shown in figure 16. In 1964, 40 sand pits in 17 counties reported production totaling 11.9 million tons, or 25.4 percent of the state total for the same year. The leading sand-producing counties in 1964 were, in order of output, Grundy, Peoria, and Tazewell.

Production and value of gravel produced in the East-Central Illinois Region between 1955 and 1964 are shown in figure 17. Seventy-eight gravel pits located in 20 counties reported production in 1964 and their cumulative production amounted to 6.2 million tons, or 37.2 percent of the Illinois gravel production. The leading gravel-producing counties in 1964 were, in order of output, Peoria, Grundy, and Tazewell.

A great many Illinois sand and gravel operations produce both sand and gravel from the same pit, but the ratio of sand to gravel varies considerably, depending upon the geology of the deposit and the markets for the various products. Some operators produce only sand or only gravel from their pits.

SILICA SAND

In addition to the common sand and gravels, the East-Central Illinois Region possesses some of the most extensive high-purity silica sand deposits in the United States. The source of this sand is the famous St. Peter Sandstone, which is composed almost entirely of well rounded quartz grains. This sandstone has been an important source of silica since the middle of the nineteenth century, partly because its thickness and its weakly consolidated nature facilitate mining. In the vicinity of Ottawa, Illinois, the St. Peter Sandstone is 135 to 160 feet thick. The purity of the sand is demonstrated by the fact that pit-run sand characteristically tests more than 97 percent silica (Willman and Payne, 1942, p. 234). Simple washing of the crude sand will remove clay and other impurities and yield a product that is more than 99 percent pure silica.

With regard to the reserves of high-purity silica sand deposits, Willman and Payne (1942, p. 238) wrote:

> The resources of the St. Peter Sandstone in the Ottawa area are almost inexhaustible and nearly all the present quarries have large reserves. Many sites for new pits are present and a large number of quarries which have not been operated recently could be if warranted by increased demand for silica sand.

LaSalle County is the center of the Illinois silica sand industry. In fact, in 1964 all of the Illinois silica sand production, with the exception of a relatively small tonnage in Ogle County, was produced in LaSalle

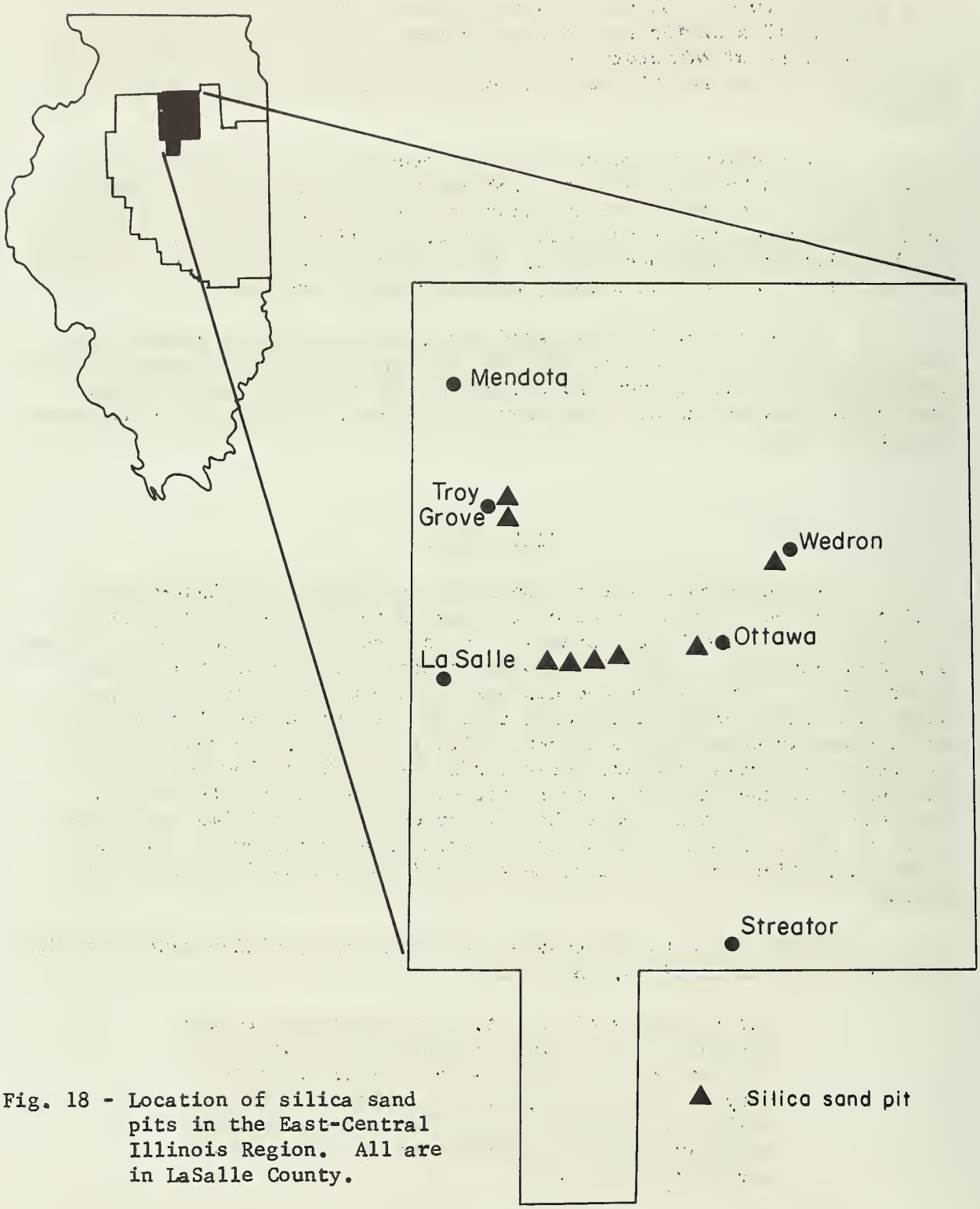

Fig. 18 - Location of silica sand pits in the East-Central Illinois Region. All are in LaSalle County.

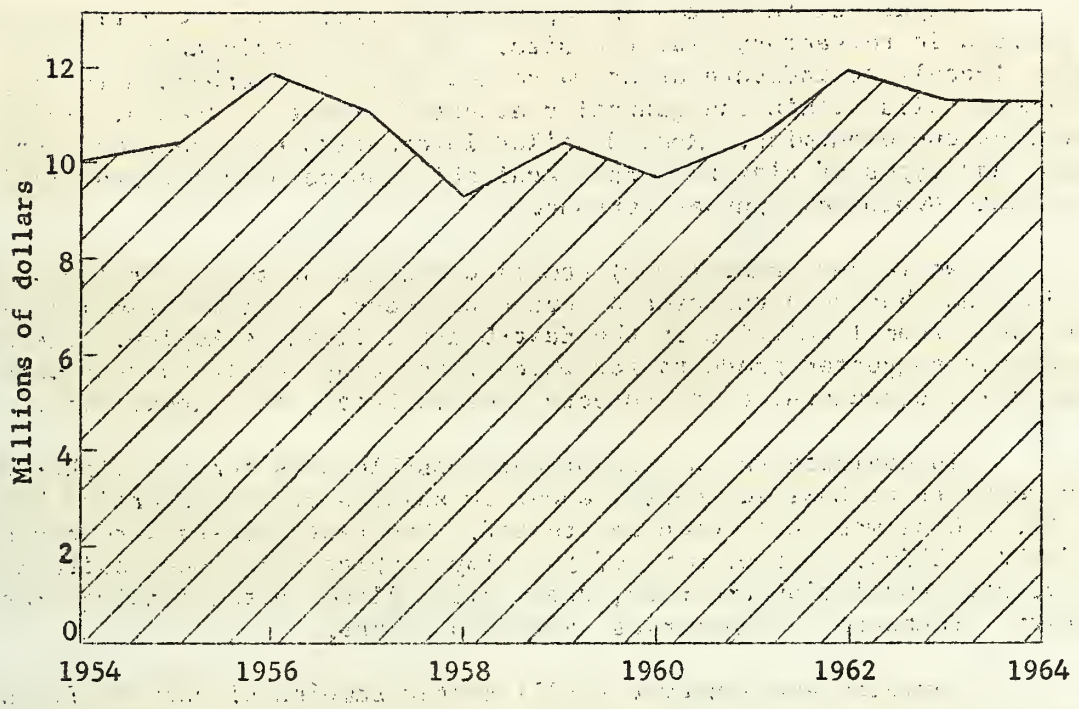

Fig. 19—Value of production of silica sand in Illinois, 1954 to 1964. Included are silica sand from Ogle and LaSalle Counties and a small amount of ground siliceous material (amorphous silica) from Alexander County.

County. In 1964,5 companies were operating 7 pits producing silica sand. In recent years the Ottawa Silica Company has been the largest producer. Location of existing pits in the East-Central Illinois Region is shown in figure 18.

In 1964 Illinois producers reported production totaling $11.3 million worth of silica sand. About 50 percent of this sand was consumed in glass manufacture and another 30 percent was used as molding sand. Value of production of silica sand in the state during the past decade is shown in figure 19.

CLAY AND CLAY PRODUCTS

Extensive exposures of Pennsylvanian clays and shales occur in the East-Central Illinois Region. These materials form the raw material base for a thriving clay products industry in the area. A number of clay and shale samples from the area have been collected and tested and the results were published by Parmelee and Schroyer (1921), Parham (1959), White and Lamar (1960), and White (1960). Figure 20 shows the localities from which the samples were collected.

Figure 21 indicates the approximate limits of the various grades of strippable refractory clay deposits. The term "strippable" is used rather loosely to indicate areas where the ratio of overburden to clay thickness falls within the generally accepted limits of present mining practices and economics. More detailed information on locations, tonnages, and types of clay resources available can be obtained from Illinois State Geological Survey personnel.

White and Lamar (1960) compiled results of tests for 125 samples of clay that had been run over a period of years. Of these samples, 29 were taken from localities in the East-Central Illinois Region. The most frequently suggested products for which these clays could be used were drain tile, structural clay products, common brick, and flower pots.

To evaluate the nature of and possible uses for the light-burning clay deposits of LaSalle County, about 50 samples of the underclay below the No. 2 Coal were collected and tested. The test results were reported by Parham (1959). One or more of the clay samples were found suitable for use as structural clay products, drain tile, flower pots, bonding clay, pottery, stoneware, refractories, and flue liners.

Parmelee and Schroyer (1921) tested samples of various Illinois fireclays, among them 22 from LaSalle and Grundy Counties. The tests revealed that the latter clays were suitable for use in the manufacture of refractories, face brick, architectural terra cotta, stoneware, sanitary ware, common brick, and common tile.

New construction methods requiring lighter building materials have increased the market demand for lightweight aggregates. Illinois clay and shale resources suitable for such use were discussed by White (1960) and White and O'Brien (1964). These reports contain the results obtained from testing 19 samples collected in the East-Central Illinois Region. At the present time plants at Marseilles and Danville are producing lightweight aggregate.

As transportation costs constitute a substantial portion of the final price of many clay products, production of these low-unit-value materials is usually concentrated in or near the metropolitan areas adjacent to the major markets. This explains to a large degree the thriving clay products industry in the East-Central Illinois Region. Plants in the northern part of this region supply clay products for the huge Chicago market and the towns along the Illinois River, such as Joliet and Peoria. With the extension of the Chicago metropolitan area to the south and west, the clay operations of the region should be in a good position to meet the demands of this expanding market for clay products.

The production of clay products by Illinois manufacturers has been between 50 and 60 million dollars worth annually for the past decade. From 1954 to 1964, the East-Central Illinois Region accounted for between 25 and 40 percent of the state's production. In 1964 there were 14 clay products operations in the region, located in 7 counties, and

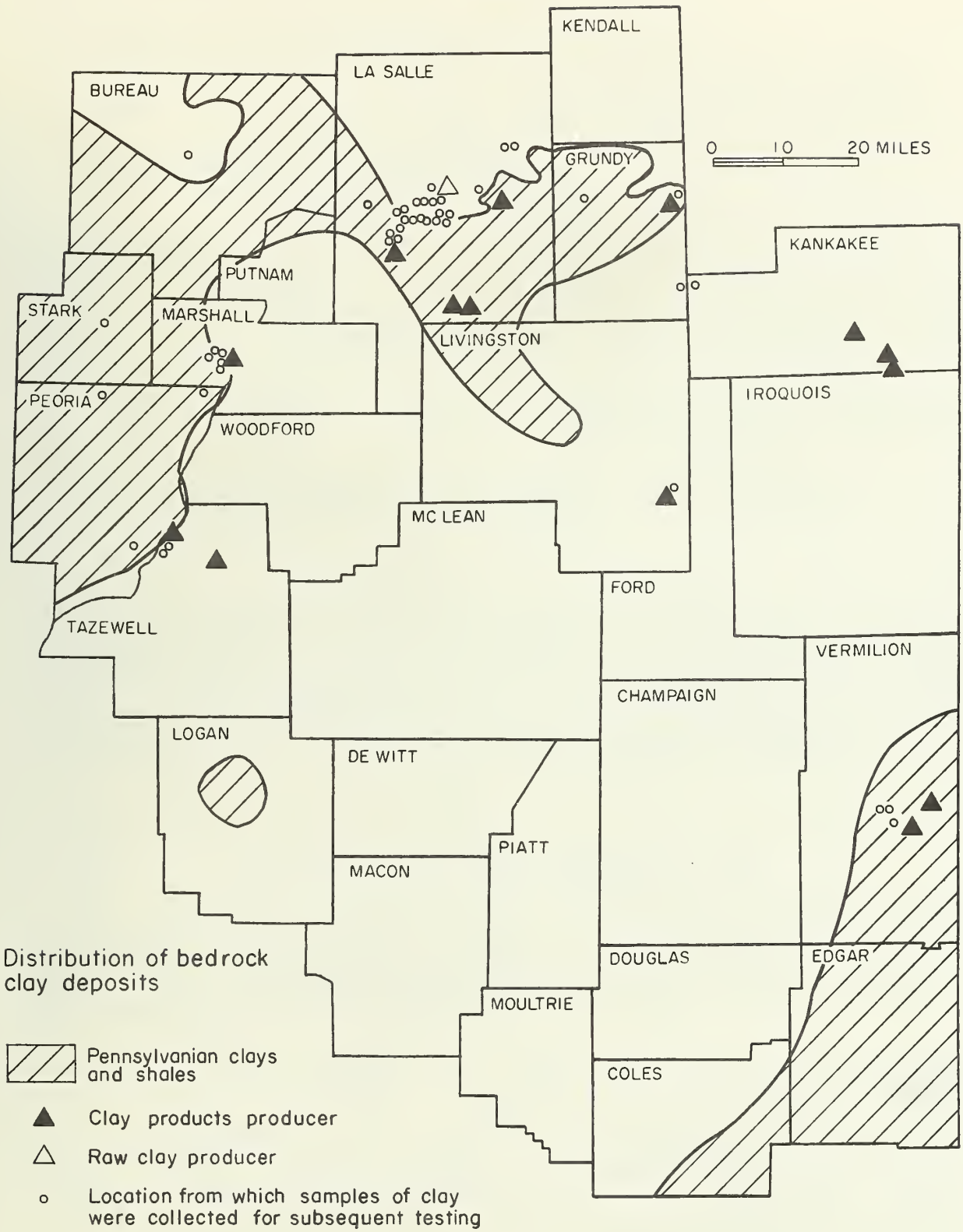

Fig. 20 - Clay resources and operations in the East-Central Illinois Region and location of clay samples collected there. (Data from White and Lamar, 1960; Parham, 1959; White and O'Brien, 1964.)

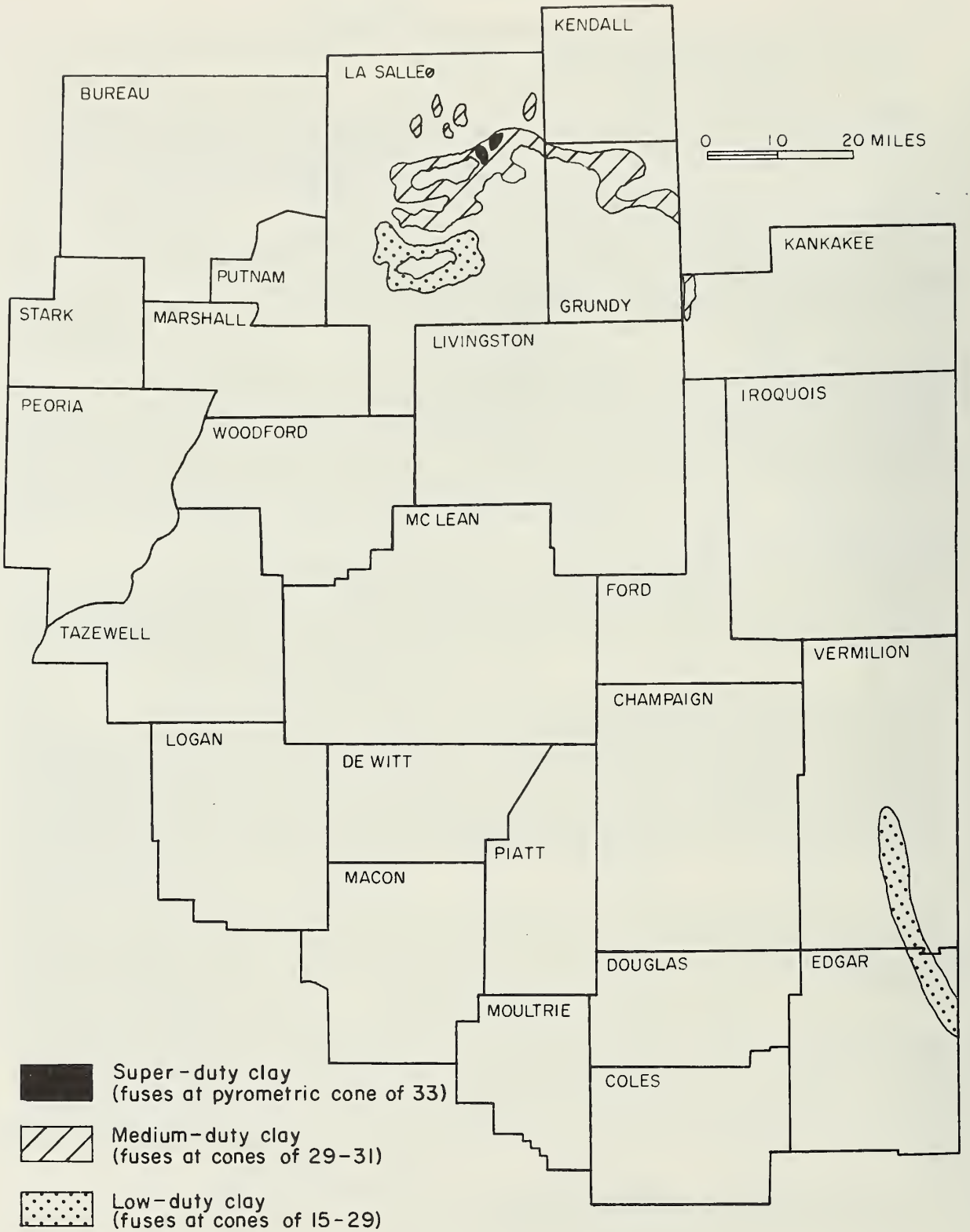

Fig. 21 - Strippable refractory clays in the East-Central Illinois Region. (Data from White and O'Brien, 1964.)

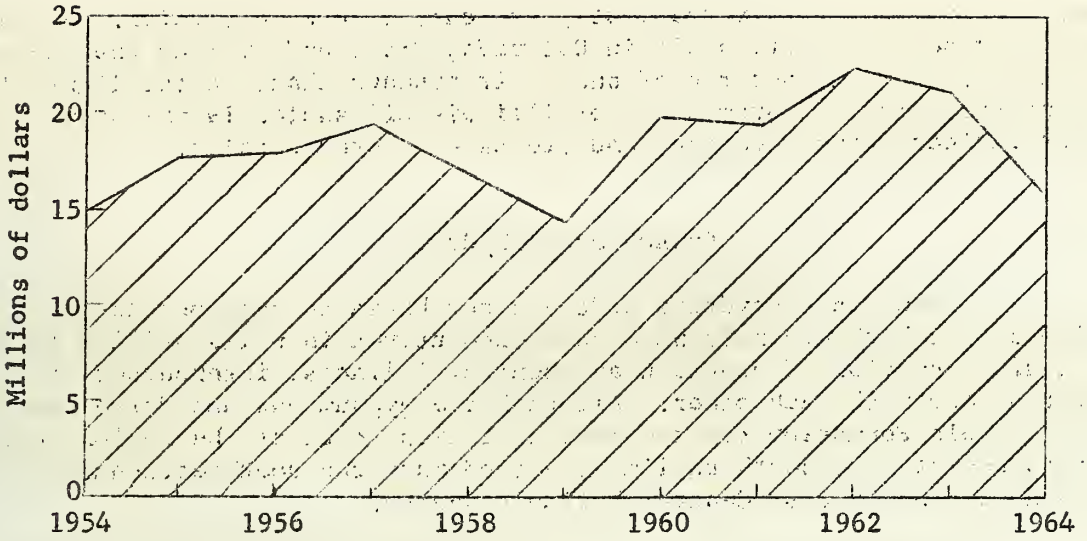

Fig. 22—Value of clay products production in the East-Central Illinois Region, 1954 to 1964.

one operation in LaSalle County which produced only raw clay. Eleven of the plants produced structural clay products, including lightweight aggregate; two produced fireclay refractories; and one produced whiteware and pottery. Figure 22 shows the value of clay products produced in the East-Central Illinois Region between 1954 and 1964. The leading clay products-producing counties, in order of 1964 values, were LaSalle, Grundy, and Vermilion.

UNDEVELOPED MINERALS OF POTENTIAL IMPORTANCE

Illinois possesses a number of mineral deposits that, at present, are not being exploited. The low grade of the materials and/or the high cost of processing them have made their exploitation uneconomic in the past. A brief discussion of these resources and the problems associated with their use follows.

Oil Shale

Literature as early as 1870 reported the presence of oil in certain shales in Illinois. However, no comprehensive testing or evaluation of these shales was carried out until 1956. At that time, members of the staff of the Illinois State Geological Survey collected and tested 114 samples taken from 41 counties of the state (Lamar, Armon, and Simon, 1956). Twenty-one of the samples were collected from locations in the East-Central Illinois Region, but only one of these yielded more than 20 gallons of oil per ton of shale. Of equal importance is the fact that

these oil shales are, for the most part, only 1 to 2 feet thick. As there are vast reserves of oil shale in Colorado, Utah, and Wyoming that average more than 30 gallons per ton of shale, it appears that, in the light of present technology, economic use of Illinois oil shales is unlikely. Figure 23 indicates the locations and yields of tested samples.

Gypsum and Anhydrite

Gypsum and anhydrite beds are not known to crop out anywhere in Illinois, but both minerals have been encountered in wells drilled in the St. Louis Formation of southern and central Illinois, interbedded with limestone and with each other. Although the gypsum and anhydrite area in the St. Louis Formation for the most part lies south of the region covered in this report, its northern limits extend into the southwesternmost row of counties in the East-Central Illinois Region.

Additional information concerning these resources can be found in the report by Saxby and Lamar (1957).

Feldspar-Bearing Sands

Feldspar, an essential constituent in the manufacture of glass, pottery, and ceramics, is a mineral occurring in many Illinois sand deposits. In 1964 Illinois was the third largest consumer of ground feldspar in the United States, using 49,822 tons, all of which came from out-of-state because no feldspar was produced in Illinois (U. S. Bur. Mines, 1965a, p. 470). At present, feldspar is imported from Colorado, South Dakota, and North Carolina, involving substantial freight charges. For this and other reasons, it has been suggested that certain of the sands in Illinois might be beneficiated to produce a feldspar concentrate of acceptable grade that could supply all or part of the state's needs.

The locations of sand samples tested by Willman (1942) and Hunter (1965) for feldspar content are shown in figure 24. Twenty-five samples of feldspar-bearing sands—12 from the Kankakee area, 6 from the Lacon area, 5 from the Havana area, and 2 from the Prophetstown area—were collected by Willman. Hunter restudied three of Willman's samples. When tested, most of the samples taken from localities in the East-Central Illinois Region showed rather low feldspar contents. The sands from the dunes in the Kankakee area showed the highest feldspar content. The fine-grained dune sands in this area have relatively high feldspar contents compared to other Illinois sands (Willman, 1942, table 13; Hunter, 1965, table 5).

A key factor in the utilization of feldspar for ceramics and glass-making purposes is its iron oxide content. The maximum allowable for flint (clear) glass is 0.05 percent iron oxide (Fe_2O_3); for amber glass it is 0.50 percent (U. S. Bur. Mines, 1965b, p. 322). Hunter (1965) studied the mode of occurrence and amount of iron oxide in the feldspars of his sand samples. He found that the sands contain potash feldspar,

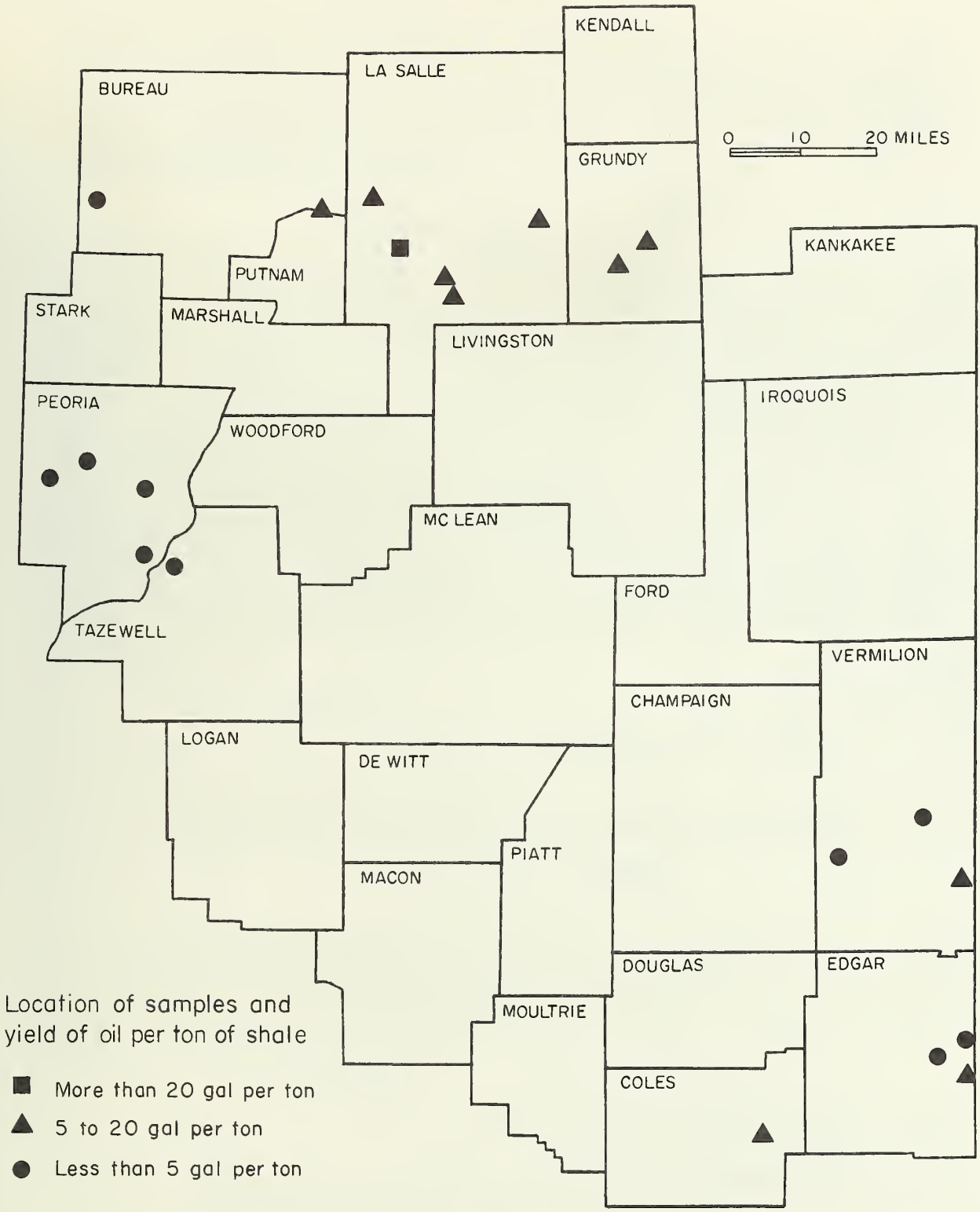

Fig. 23 - Locations from which oil shale samples were taken in the East-Central Illinois Region. (From Lamar, Armon, and Simon, 1956.)

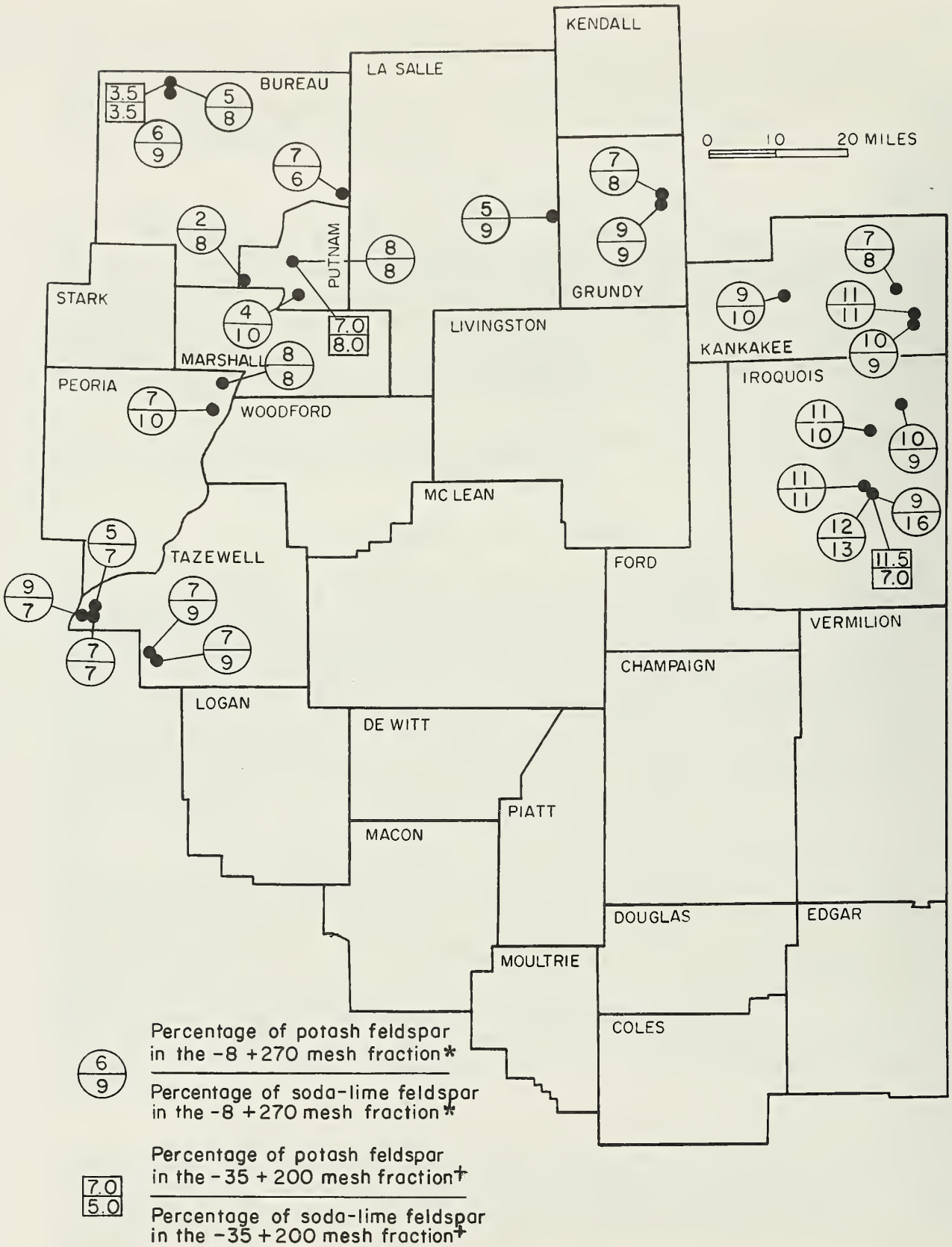

Fig. 24 - Feldspar-bearing sands in the East-Central Illinois Region. (*Willman, 1942; +Hunter, 1965.)

soda-lime feldspar, and feldspathic rock fragments, and that the potash feldspar contains less iron oxide than either of the other forms. When the feldspars were treated with acid in the laboratory, their iron oxide content was reduced to near commercial grade. Treated samples of potash feldspar contained from 0.10 to 0.31 percent iron oxide, whereas treated soda-lime feldspar had from 0.16 to 0.56 percent.

Pyrite (Coal Brasses)

All coals contain sulfur in varying amounts; the sulfur occurs in three forms—as pyrite, as organic compounds, and as sulfates. Much of the pyrite, known as "coal brasses," is removed during coal cleaning processes. However, because of a lack of market, they usually are discarded. In 1952 when sulfur was scarce on the world market, Voskuil (1952) prepared a study on the market outlook for sulfur recoverable from coal. However, during the late 1950s and early 1960s sulfur production exceeded demand. In 1961 and 1962, production outstripped demand by a million tons, and prices were depressed to $20 per ton. By 1965, however, a shortage had developed and the prices were up to $31 per ton (Mining Jour., 1966, p. 23). If the shortage continues and prices are forced upward, it may become economic to exploit such sources of sulfur as coal brasses. Present methods of manufacturing sulfuric acid from pyrite, however, require that the carbon content of the pyrite be low.

PROCESSING, TRANSPORTATION, AND DISTRIBUTION FACILITIES

Introduction

The East-Central Illinois Region possesses, in addition to primary mineral production facilities, various processing, transportation, and distribution facilities related to the mineral industries of the region. The locations of these facilities are shown in figures 25, 26, and 27.

Metals

The East-Central Illinois Region has one ferrous and one nonferrous metal plant in operation, and a large new iron and steel complex is to be built in the next few years at Hennepin (fig. 25).

Keystone Steel and Wire Company operates four open-hearth furnaces and one rolling mill in Peoria (Amer. Iron and Steel Inst., 1964). New Jersey Zinc Company operates a vertical retort type of zinc smelter

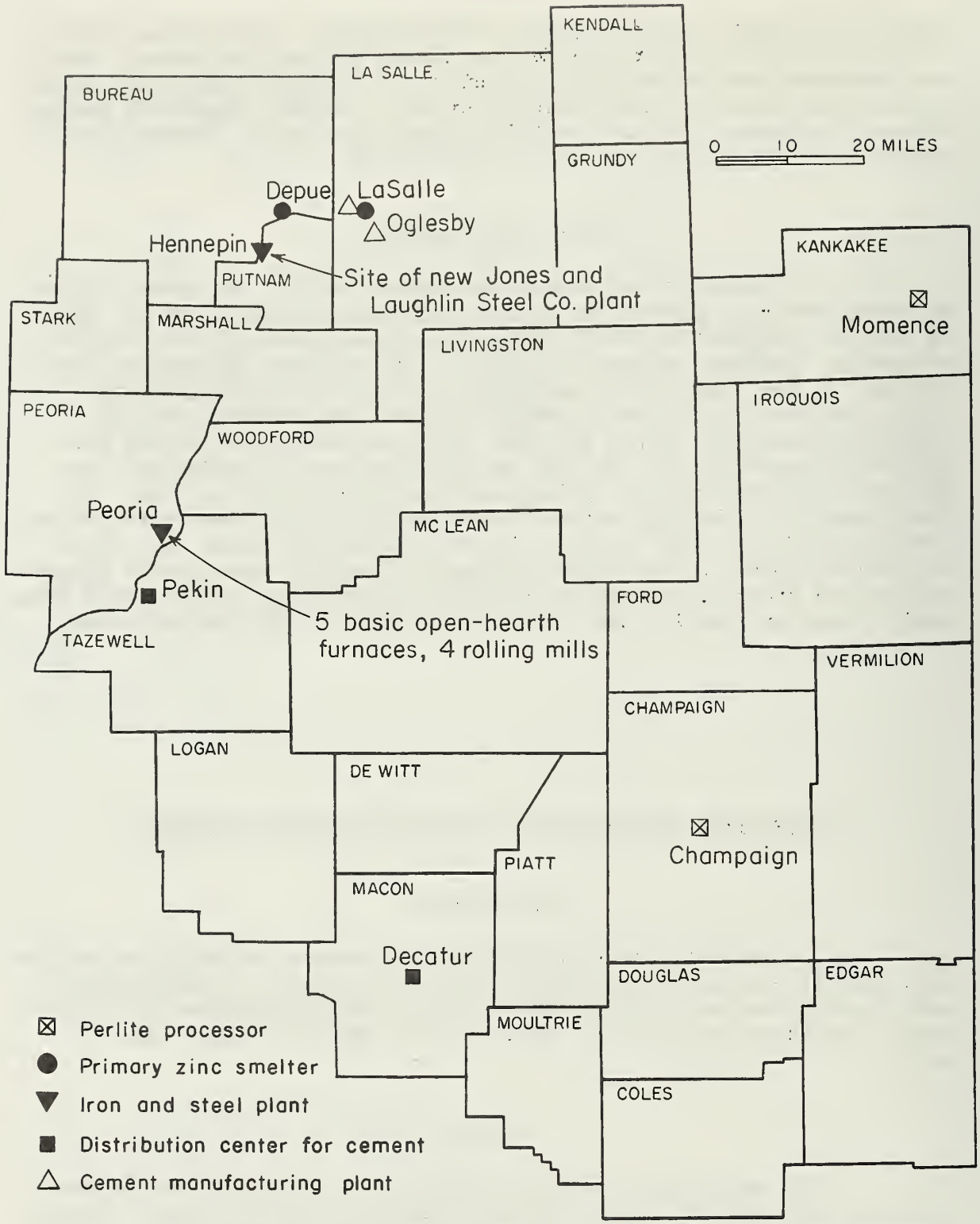

Fig. 25 - Mineral and metal processing facilities in the East-Central Illinois Region.

at Depue in Bureau County. In 1963 that company increased its productive capacity of slab zinc and zinc dust by building three new vertical retort furnaces and five zinc dust furnaces (U. S. Bureau of Mines, 1964, p. 374). The horizontal retort zinc smelter of Matthiessen & Hegler Zinc Company located in LaSalle has been closed since July 1, 1961.

In early 1965, the Jones and Laughlin Steel Corporation announced what promises to be one of the largest integrated iron and steel plants in the Middle West. During 1966 construction was begun on a steel finishing plant at Hennepin in Putnam County for the processing of finished steel ingots produced at Jones and Laughlin plants in the East. The intial investment of some 150 million dollars is expected to be increased to $600 to $700 million at the time a fully integrated (ore to finished products) plant is completed, within the next 10 years. This iron and steel complex is expected to produce about 2 million tons of steel annually and to employ between 5500 and 6000 persons.

Nonmetallics

Crude perlite mined in New Mexico is processed in two plants in Champaign and Kankakee Counties (fig. 25). Ryolex Corporation of Champaign produces plaster additive from expanded perlite, while the U. S. Perlite Corporation produces accoustical aggregate at its Momence plant (U. S. Bureau of Mines, 1964, p. 374, 379).

Two of the four cement plants in the state of Illinois are located in LaSalle County and they turn out well over half of the state's production. The two plants now in operation are the Alpha Portland Cement Company plant at LaSalle and the Marquette Cement Manufacturing Company plant at Oglesby. The plants both produce portland and masonry cement from the LaSalle Limestone, which is of Pennsylvanian age. Late in 1963 Lehigh Portland Cement Company closed down its Oglesby plant (U. S. Bureau of Mines, 1964, p. 366). Cement distributing plants are operated by Missouri Portland Cement Company in Pekin and by Lehigh Portland Cement Company in Decatur (Pit and Quarry, 1965).

New Jersey Zinc Company has announced its intent to construct a multimillion-dollar phosphate fertilizer complex adjacent to its zinc plant at Depue, Illinois. The plant is designed to have an annual capacity of 270,000 tons of diammonium phosphate. The complex will include a 60-tph rock grinding plant, an acid clarification system, a 900-tpd diammonium phosphate plant, and facilities for storage and handling of raw materials and finished products (Eng. & Mining Jour., 1966, p. 119, 121).

Oil and Gas

In addition to crude oil production operations, the East-Central Illinois Region has numerous transportation facilities. Figure 9 indicates the location of the crude oil pipelines within the region. The extent and locations of refined products pipelines in the area are shown in figure 26.

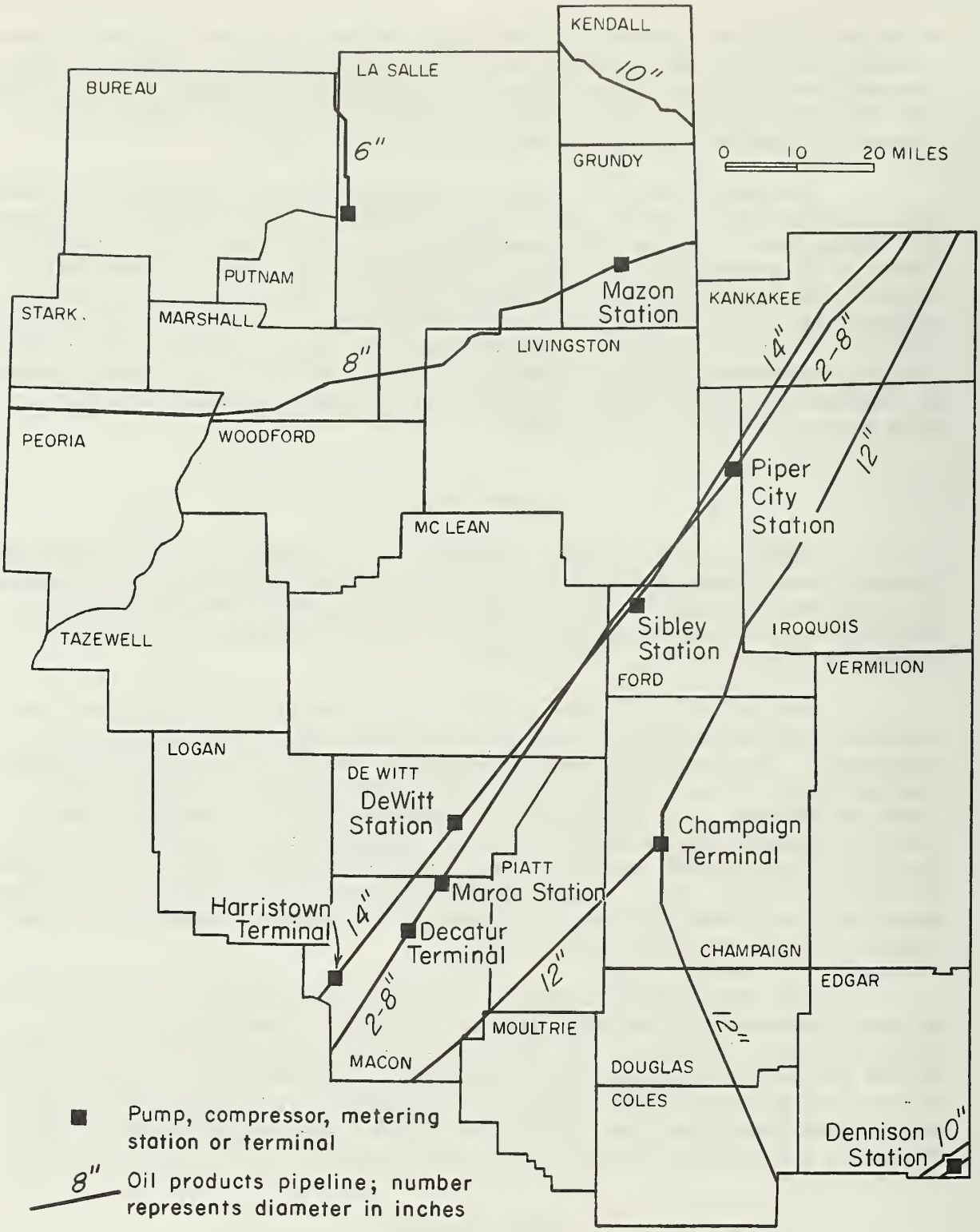

Fig. 26 - Refined petroleum products pipelines in the East-Central Illinois Region.

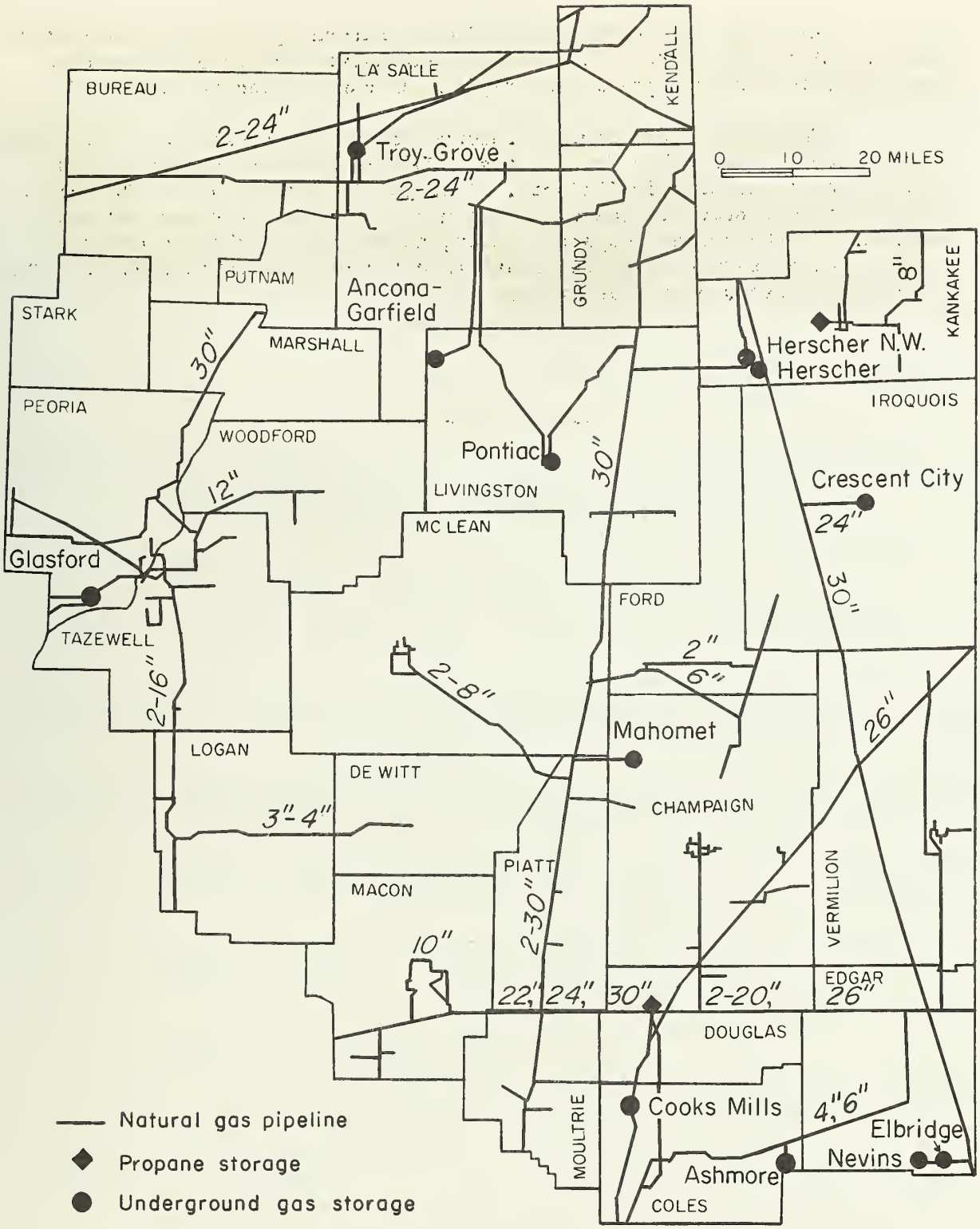

Fig. 27 - Natural gas pipelines and storage facilities in the East-Central Illinois Region.

Although the actual production of natural gas in the East-Central Illinois Region is quite low, there are extensive pipelines and storage facilities for natural gas in the region, as can be seen in figure 27.

Underground gas storage reservoirs in this region have a capacity of over 300 billion cubic feet of gas. This is about 85 percent of the total storage capacity in Illinois. This gas is stored during the summer and is then withdrawn in the winter to meet the demand for gas for space heating. On the coldest days of winter, about half of the gas consumed in the northeastern part of the state (about 2 billion cubic feet per day) comes from these storage reservoirs.

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